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UNIT type construction makes change-over easier and less expensive. Heads are of the detachable type and cam feed units are of standard design.

This illustration shows the use of two small units, one driving a two spindle head and the other a four spindle head.

Three larger sizes are made for heavier jobs or jobs having larger spindle layout.

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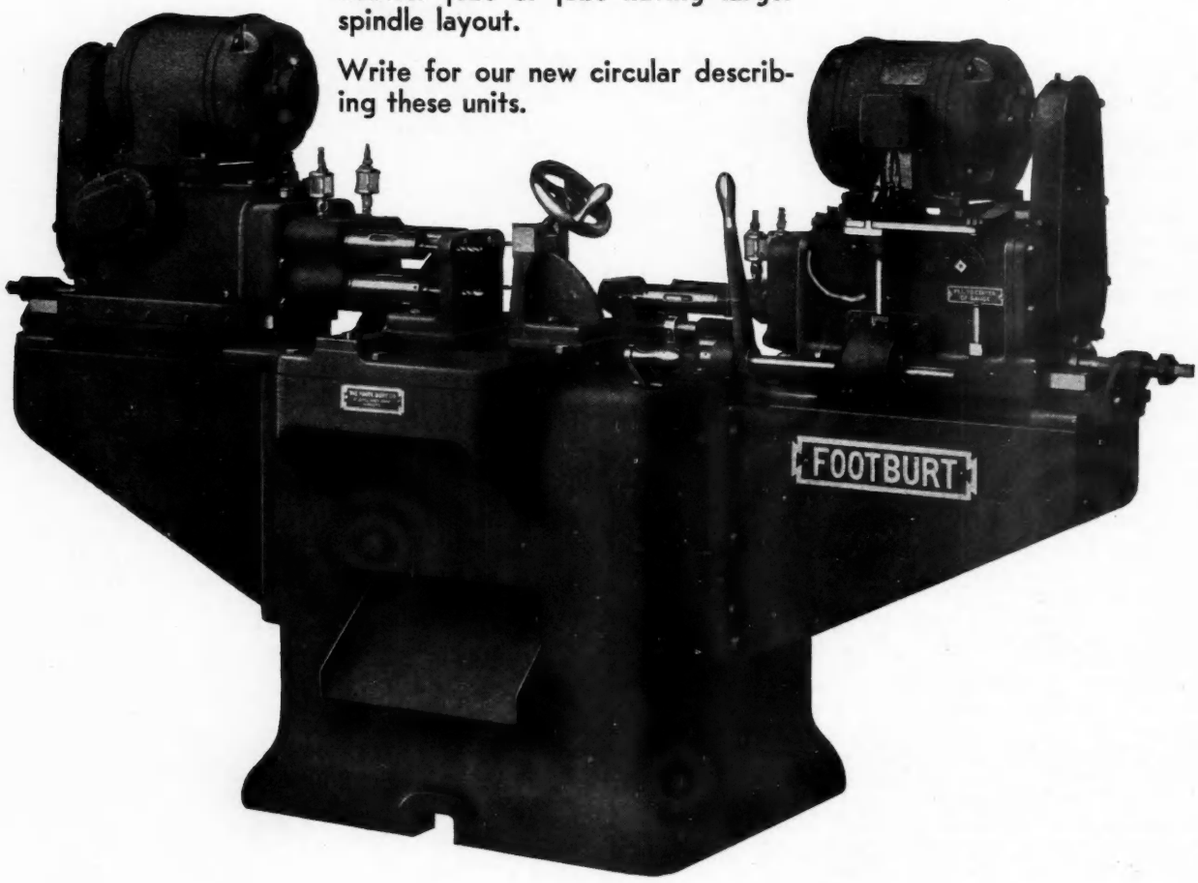

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AUTOMOTIVE INDUSTRIES

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Recovery Bill Presents Industry with New Problems and New Opportunities

Offers Chance for Agreement on Wages, Working Hours, Production, Prices and Merchandising Policies Such as Advertised Delivered Prices, Clean-Up Sales and Used Car Trading

by Don Blanchard
Editor, Automotive Industries

OPINIONS differ as to whether in the National Industrial Recovery bill, industry is getting what will turn out to be a straight-jacket, which will delay a return to normal or a stimulant that will shorten its convalescence from the ravages of depression. However, with the bill regarded as certain to become law, for the present, speculation as to which of these viewpoints eventually will prove correct, becomes academic. From a practical standpoint, the question of immediate importance is what will be the effects on industrial operation.

The language of the bill is so broad and its provisions so flexible that evaluation of its effects is exceedingly difficult, although there is quite general agreement that it will increase costs and consequently prices. Under the circumstances, it was obviously essential that freedom of administrative action be provided, inasmuch as the ship of state will be sailing in uncharted waters and the helmsman must be free to shift his course to avoid shoals and reefs as they are discovered. The emphasis which the Government has placed on the partnership idea, however, indicates that its attitude is one of helpfulness and that it desires to inject itself into business only insofar as it is necessary to promote constructive, cooperative action within an industry and to protect the public interest.

As in the case of other legislation sponsored by the Administration, the Recovery bill is in line with the Roosevelt policy of experimentation to find the solution of our economic problems. It represents the first move in the direction of economic planning on a broad scale and it gives industry its first opportunity to work cooperatively in an effort to control economic forces. Undoubtedly the break with tradition, which it represents, is regarded in some quarters with considerable misgiving. Regardless of such individual opinions, it represents a sincere attempt to lift the country out of depression and, as such, is expected to receive the support of industry. Although the licensing provisions give Government the power to force cooperation, the chances of reaching the unquestionably desirable objectives of the bill will be considerably enhanced if individual doubts regarding its practicability or desirability are submerged to give the proposals a thorough practical test. In fact, any benefits which the bill provides, in the final analysis may depend very largely on the effort industry makes to realize on its possibilities.

Despite the unavoidable uncertainty regarding many of the effects of the bill, one thing is clear, however, and that is that foremost in the minds of the framers of the bill was the expansion of employment by the share-the-work route and the protection of labor from the impact of destructive price competition. This seems evident from the fact that the only specifications as to what "Every code of fair competition, agreement and license" must contain, have to do with labor.

Whether in the administration of the bill, equal solicitude will be shown for capital investment is a question which must remain unanswered until events demonstrate what policies will be followed. The bill exempts agreements, codes of fair competition, etc., for which it provides, from the operations of the anti-trust laws. This means that with the approval of the Government, industry may control production and fix prices through its trade associations. How far the Government will go in permitting these privileges to be exercised for the protection of capital investment is open to serious question, particularly if the effect is to nullify the employment objectives of the bill. It is conceivable that permission to exercise these privileges might be

With a flat statement by Budget Director Douglas fresh in its mind that an emergency exists and that revenue must be obtained regardless of equities, the House Ways and Means Committee ditched the fair, but politically bad, sales tax and wrote into the National Industrial Recovery Bill a ¾ cent increase in gasoline tax and new levies on incomes.

The extra tax on fuel represents an estimated increase in costs to motorists of $92,000,000. Add this to the $123,000,000 which the present one cent federal levy on gasoline yields and throw in the excise taxes on new motor vehicles, parts and tires which are to be continued, and then ask yourself "Who Pays for Public Works?"

Additional revenue had to be obtained to finance the $3,300,000,000 public works proposal and the President is to be commended for his insistence that the Bill include specal provision for the retirement of the bonds issued to finance the enterprise. To get the necessary money, possibly equities should be disregarded in the present emergency, as the Budget Director said, but why the equities of the motorist should always bear the brunt, is a question which only a Congressman anxious to hold his job can answer.

granted only to the extent that is necessary to assure labor of the benefits provided by the Act.

Insofar as labor is concerned, the Recovery bill aims at the same target as the Black 30-hr. bill with the Perkins amendments but with none of the rigidity of those proposals, except in the public works section. Instead of specifying five days of six hours each, with certain exceptions to take care of seasonal requirements, the Recovery bill leaves it to industry through its own organizations to set its own standards of hours and wages, subject to approval by the Administration. When such standards have been approved, they become binding on all concerned, including any dissenting minority. On the other hand, if an industry does not move to set up such standards and the Administration believes that conditions within the industry demand minimum wage and maximum hour regulations, it may establish such standards for the industry.

While these provisions obviously provide a high degree of flexibility, Administration attitude clearly shows that it considers necessary a reduction in the average work week under present conditions. Trade association thought is toward a 40-hr. week. Consequently, it seems reasonable to expect that standards proposed by industry for approval will have to hit somewhere near this mark. Undoubtedly suitable latitude will be provided for each industry to meet its special needs. Probably the most satisfactory standard of this kind would be that suggested by Alfred P. Sloan, Jr., of setting a maximum number of hours per year per man, with a limit of say eight hours in any one day and 48 hours in any one week. Such flexibility would permit more efficient production than any rigid schedule such as five days of six hours per week and at the same time would accomplish the share-the-work objective.

Minimum wage standards for an industry probably will be set up on a regional basis within an industry. For example, living costs are not the same in Detroit, Lansing, Flint, Toledo, Cleveland, South Bend, Chicago, Kenosha, etc. If this factor is taken into consideration in setting minimum wages, they might be different for automotive manufacturers in each of these centers. Permanent regulation of this character undoubtedly would provide a strong incentive to decentralization, as living costs average lower in the smaller communities.

Another labor provision of some importance in the bill reaffirms the right of labor to bargain collectively, and that no employee or no one seeking employment shall be required as a condition of employment to join or to refrain from joining any organization of his own choosing.

Unless required to do so, it is doubtful that the automotive industry would undertake to control production or to distribute it among the various car factories. The difficulties of so doing are so great as almost to foredoom any effort to failure. If the effect of the bill is to raise costs and to increase prices quoted by suppliers, as it almost certainly will, higher car prices would, of course, be inevitable.

What effect higher prices would have on volume is debatable, but there already is a strong sentiment among both vehicle and parts makers for a move in this direction. At present price levels, the industry is below the profit point and prices would be advanced on some lines at least if it were not for the fear that any increase in income per unit sold would be more than offset by a decline in sales. A general advance, however, would leave the different car makers in the same competitive position and, if of moderate proportions, many believe would have no perceptible effect on sales. As for the parts, material and production equipment makers, a general advance in prices would be more than welcome.

In this connection, it is interesting to speculate on what the policy of the Administration will be if a general advance in prices as a result of an agreement permitted by the Act is followed by a material decline in sales. This would mean a decrease in employment which

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JUST AMONG OURSELVES

Still Target For Tax Snipers

FIGHTING tax battles has long since become a habit with the automotive industry. If it didn't have a tax battle on its hands, the industry would feel as though there must be something wrong.

Having had excise taxes imposed on cars and parts last year, we now are faced with the possibility of a general sales tax in addition to help pay for Roosevelt's worthy construction bill projects.

Never having admitted the fairness of the discriminatory 3 per cent tax in the beginning, it is only natural that the industry should take the stand that the 3 per cent tax should be removed if its products were to be taxed 1 to 1¼ per cent as part of a general sales tax move.

While the practical likelihood of such removal is not bright, it is hardly conceivable that the 1-1¼ per cent proposed general sales tax should be added to the 3 per cent already levied against automobiles. At least, automobiles should be left with their present scale, which still would be two or three times as great as that proposed for application to all products sold.

The automotive industry is not opposed to a general sales tax; many leading executives, in fact, favor such a tax very strongly. It is, and probably always will be, however, opposed to bearing more than its share of the tax burden; to being singled out as a special target to receive more tax blows than other industries.

* * *

Economy for $15,000,000

CARRYING one step further the discussion about whether or not an "economy car" could be made successful in the United States, the following speculation may be pertinent:

The "economy car" (see J.A.O. of April 15 and P. M. Heldt on "Would Economy Sell Lower-Geared Cars?" in the same issue) almost certainly would have to be the product of a large organization already geared up for quantity production. It is scarcely conceivable that such a car could be brought down to extremely low price levels unless produced in quantity.

That means that any company building a car, *on the economy features of which its entire chances of success were to be staked,* would have to gamble some $15,000,000 more or less on the venture, including all costs of design, tooling, experimentation and merchandising. (A leading production executive told us only a week ago that $15,000,000 was a conservative estimate.)

And since much of the possibility for continued success of such a car might rest on continuance of the depression—or at least on a long continuance of the present lower standards of living—the manufacturer contemplating introduction and merchandising of such a car is faced with gambling $15,000,000, not only on the desires of the public as regards an automobile, but also on the relative length of the period of hard times.

All of which doesn't argue that the experiment if made wouldn't be successful; but adds another reason to explain why the experiment hasn't been made thus far.

* * *

Limiting Design

RECENT legislation compelling use of safety glass brings again into the foreground the whole question of legislating about design features of motor vehicles.

Every time specific legislation regarding a design detail of a motor vehicle becomes a part of a fixed law, the flexibility of design potentialities is reduced. Chances of retarding future design are increased, because laws never can be changed until long after the possibilities of improved practice have long been practical.

However meritorious the particular item may be—and certainly there is general agreement as regards the desirability of safety glass—the principle of writing detailed design requirements into the inflexibility of state law must always be questioned.—N. G. S.

BUYERS REMEMBER THE "BUGS"

Long After Engineering Fixed and Forgotten

BOTH manufacturers and dealers well know that when the car-buying public realizes a fault exists in a new model, selling resistance is quickly created. Nor does it require a very intimate familiarity with the industry to know that the rapidity with which corrections are made, and in turn the attitude toward the car owner taken by the dealer's service department both have a profound influence upon the speed with which public acceptance is regained. But the extent of these influences in breaking down the good will of owners, the length of time they affect car acceptance, their effect upon dealer sales problems, and finally the relationships existing between them seem not to have been evaluated up to this time.

A study of design and service problems extending over some years discloses some interesting and, it is believed, heretofore unknown relationships between the importance and appearance, and then the correction, of designs which do not prove satisfactory, either at once or after relatively long periods of car use. This study includes many makes of cars and a wide variety of models.

The accompanying table is an attempt to illustrate and to summarize as specifically as possible these relationships and their ultimate effect upon the public's ideas concerning car defects.

Analysis of the periods of time required for the recognition and correction of car imperfections would indicate that *it requires from two to three times as long for the factory to make corrections* of a permanent and satisfactory character (if it does) as it does for the public to become generally aware of a defect in a new model; but what is far more important, *it requires at least twice to three times again as long for the public to be "resold" on that model*, and to feel certain that recurrence of the particular trouble will not take place.

For instance, if car owners discover the existence of some fault of design or manufacture within about one month of delivery, and in turn knowledge of the fault becomes general in about two months, sales resistance will continue sufficiently strong to be noticeable by the dealer as long as a year or even

Summary of Survey Showing How "Bugs" Affect Sales

Make or Model	Approximate Time Req'd For Fault to Appear in Car	Time Req'd for Public to Recognize Fault as a Prevalent or Inherent Weakness in Car	Time Req'd for Factory to Recognize Change and Take Correctional Measures	Time Req'd to Fully Overcome Sales Resistance	Notes and Remarks
A	7 to 8 months	7 to 8 months	Not corrected in that model	Car still thought be a "Lemon"	Unfavorable comment on this model reflected on acceptance of entire line. Service men could "predict almost to a day" when car would be back in shop with dissatisfied owner.
B	10 to 30 days	6 months	18 months	3 years	Although trouble corrected in succeeding model and adjustments made on all cars in use car owners still say all cars of this make "not as good as they used to be."
C	2 to 15 days	2 months	4 months	1½ years	Although trouble quickly corrected on all cars in use, public does not believe car is satisfactory.
D	8 to 10 mos.	15 months	3 years	7 years	Entire line unsatisfactory. Recreation of confidence that cars of this make "are good automobiles" was necessary.
E	1 to 10 days	3 months	Not corrected	2 years	Model thought to be "not as good as former one."
F	6 months	12 to 15 mos.	Not corrected in that model	4 years	Not serious from structural standpoint but objectionable to car owners.
G	9 to 12 mos.		Not entirely corrected to date	2 years	Impression that this model was not satisfactory still prevalent.
H	1 to 3 mos.	15 to 18 mos.	Not corrected	2 years	Line abandoned.
J	2 to 3 mos.	6 months	18 months	4 years	Model still believed unsatisfactory by some car buyers.
K	Not less than 15 months	15 to 20 mos.	20 mos. to 2 yrs.	2 to 3 yrs.	Fault required elaborate and costly changes, but promptly made when discovered.

by Edmund B. Neil

Engineers Have Forgotten Them

A Study of the Length of Time Required for the Public to Get Wise to a Defect and How Long It Is Before It Ceases to Be an Element of Sales Resistance

longer, even though the factory makes corrections and replacements promptly or within four months of the time of delivery. Several years or more have been required for car owners to "forget" completely, that the so-and-so model "isn't quite as good as the one of the year previous," or again to say that "the 'X' cars are good automobiles." Faults of design corrected within a year after the introduction of a new model have offered resistance to dealers as long as five years later. Naturally, much depends upon the attitude of the manufacturer and the dealer toward making the necessary changes. There is no question, also, that the continuance and completeness with which the car is promoted in the interim have a profound influence upon overcoming any sales resistance created by faulty design.

Certainly no trade confidences are disclosed when it is admitted that the public has been experimented upon on occasions by automobile manufacturers. The reasons are manifold. Insufficient study of engineering design problems, lack of experimental development facilities, the necessity of "bringing out a new model to meet competition quickly," without prolonged laboratory and road testing, the failure of such testing to uncover "bugs" which reveal themselves when the car gets into the hands of the public, and other reasons have been given as excuses. The public is now well acquainted with the fact that it has sometimes performed the function of testing new models and is hesitant about buying any new model until "the bugs have been taken out of it." The more the new car differs from the previous one, the greater is this tendency to hold off buying.

It is but natural that factories should be loathe to make changes which would involve the scrapage of usable parts, or which require alterations in production arrangements, particularly when the engineering department wants to institute them a few weeks after the new model is under way. In turn, the fact that changes are found is often an apparent reflection on the work of the engineering and experimental departments. "Why didn't they find out and fix this up before we got into production?" is not an unknown statement by production men, even though designers will know that "our real troubles begin" when a seemingly satisfactory job is brought out of the laboratory and sent to the production department with the "go ahead" order. Cars or trucks involving many new units which perform satisfactorily under experimental test seem sometimes to be endowed with diabolical imperfections when they have been a few months in the hands of car buyers.

Since, as has been shown, the effect of producing an unsatisfactory car extends far longer than is generally realized, has been in fact largely, if not entirely, responsible for eliminating some models and even makes of cars from the market, and whether or not it is done for any altruistic feeling of duty toward the car buyer, there are

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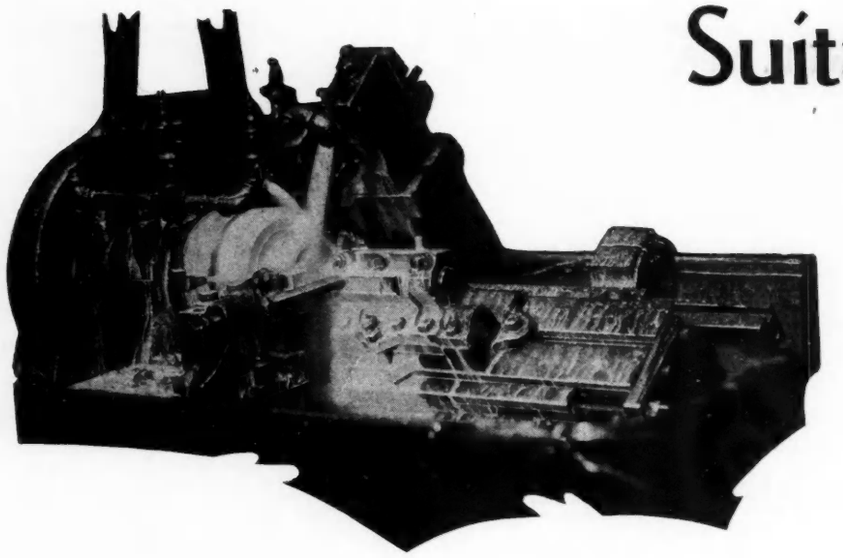
The vital importance of speed in the correction of defects is emphasized in this study by Mr. Neil. He finds that it takes buyers four to nine times as long to forget a "bug" as it takes them to discover the defect. Furthermore, the "bug" continues to have an adverse effect on sales for two to three times as long as it takes the engineering department to fix it after the public knows about it.

The survey presented here is believed to be the first published report of an attempt to evaluate the longevity of sales resistance created by defects which are discovered only after the car is in the hands of the public. It is worthy of careful study.



Suitability Only Fa

by
Joseph
Geschelin
Engineering Editor,
Automotive Industries

SUITABILITY appears to be the only safe criterion in the selection of cutting fluids.

Specifications have been insisted upon by many of the manufacturers in the automotive industry. But, in the opinion of certain investigators, this has constituted one of the biggest obstacles in the path of real economy. As applied to cutting fluids, specifications have made it difficult to encourage competitive bidding and, in some cases, have prevented suppliers from demonstrating new products which did not conform to specifications in any way.

Because of this situation, it is of more than passing interest to learn of a recent survey which indicates that a group of the largest buyers in the automotive industry has relegated specifications for cutting fluids—for the present at least. Right now these people are buying on the basis of suitability and price. This looks like a very progressive move, since it gives the shop organization an opportunity of testing the product of many reliable suppliers and selecting the materials that not only suit specific operating conditions but, also, fit their purse.

Understand, we are in absolute accord with, and are thoroughly sold on standardization and specification buying. Certainly no one can deny that standards in general have been one of the most vital factors in simplification and cost reduction. Nevertheless, it would appear to be quite unwise, and certainly uneconomical, to write standards for things which do not lend themselves to standardization at the moment.

Right now the indications are that the selection and utilization of cutting fluids is decidedly an art. It requires careful analysis and constant research in the field of machine shop practice, which is in a constant state of flux. Perhaps the best evidence of the impracticability of any degree of standardization is found in the industry-wide survey made for *Automotive Industries* some time ago[1].

In recent correspondence, Prof. O. W. Boston, of the University of Michigan, says in part, "I believe there is much to be known of metal cutting before complete specifications can be developed which will satisfy the seller and user. I do not have at this time any definite opinion as to specifications which would mean anything. The work I am doing is intended to lead up to the creation of specifications, although the more I find, the less definite final specifications appear to become."

Another well-known experimenter in this field says quite pertinently, "In order to specify accurately, we must know definitely what we are seeking. Inasmuch as we have never had any satisfactory answer to the question, 'What is a cutting oil,' it is extremely difficult to specify such an unknown quantity."

Nevertheless, despite the present difficulty of writing specifications that mean anything, much can be done to place the buying and utilization of cutting fluids on a paying basis. Perhaps the most important step in this direction is that of simplification—reducing the number of cutting fluids used in any plant, to a minimum. This step alone will produce the needed degree of standardization within any plant; it will reduce the inventory of expense materials; it will simplify the procedure in the machine shop. Some idea of the scope of the simplification project may be gained from the following list of cutting fluids commonly used.

Each heading may be expanded to include a variety of commonly used materials. 1. Water. 2. Water and alkali. 3. Soluble oils. 4. Animal or vegetable oils, such as lard, tallow, castor, etc. 5. Straight mineral oils. 6. Mineral lard oils. 7. Sulfurized mineral lard oils. 8. Sulfurized mineral oil. 9. Sulfurized fatty oil base. 10. Special types, such as emulsion soaps, etc.

Now, as we pointed out recently in *Automotive Industries*[2], the market affords three types of products which may easily meet the majority of metal cutting needs. On the one hand, we have the water soluble oils, on the other, two differ-

[1] "Extreme Variation in Cutting Fluid Practice Brought Out by Survey," by Joseph Geschelin, Automotive Industries, May 2, 1931.

[2] "Choice of Cutting Fluids Simplified by Research," by Joseph Geschelin, Automotive Industries, July 9, 1932.

Safe Criterion in Selecting Cutting Fluids

Because cutting fluids vary so widely due to differences in raw materials, methods of compounding, etc., fixed specifications are an obstacle to production economies, in the opinion of many experts

ent forms of sulfurized oils. The latter group consist of sulfurized mineral oils capable of dilution to meet the requirements of any specific operation, and a fatty sulfurized base which may be mixed with mineral oil to achieve the same results. Careful analysis of the metal cutting requirements in any individual plant should enable the factory to determine whether one or perhaps two types of materials may be selected for general use. Needless to say, certain special operations will require other types of materials, but these cases are distinctive and may be readily spotted; one example is an operation such as honing, which is best met by a mineral oil such as kerosene.

In the present state of the art of metal cutting, a cutting fluid has three basic functions which, in varying degrees are: REFRIGERATION or cooling—LUBRICITY or oiliness—FLUIDITY, wetting out or penetration. Recent work recognizes an ANTI-WELD characteristic as a fourth function which may be desirable in varying degrees. This is the action of a lubricant in preventing the welding or pick-up between the tool and the work. Secondary functions comprise such elements as control of quality of finish, vehicle for washing away chips, and aid in rust prevention.

If we could determine on each job to what extent each of these requirements must be met by the cutting fluids, the problem would be definitely licked. The right answer will automatically select the kind of material, that is, whether it be soluble oil or sulfurized, and will determine the degree of dilution—easily the most important element so far as cost is concerned.

Once this simplified standard has been adopted, certain secondary characteristics may be applied. Thus, a specification may be set up which will establish the following elements:

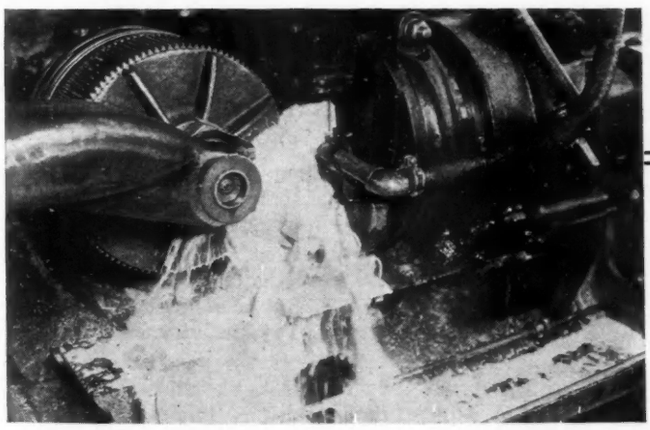


Table I.

Characteristics of commercial cutting oils most frequently used in Mid-west metal cutting plants. No. 7 is used in broaching and heavy cuts. The others are for general utility on all types of machines.

	1	2	3	4	5	6	7
Gravity (Baume)	20.5	27.5	23.5	21.2	25.2	19.9	22.5
Flash, Deg. F.	335	330	355	310	345	315	355
Viscosity, Sec.	143 @ 100	91 @ 100	92 @ 100	207 @ 100	117 @ 100	114 @ 100	245 @ 100
Sulfur, Per Cent	4.24	0.96	3.82	2.18	2.43	1.19	4.3
Color	Dark	Dark	Dark	Dark	Dark	Dark	Dark
Fat, Per Cent	None	None	None	None	None	None	15

In the present state of the art, a cutting fluid is thought to have four basic functions which in varying degrees, are: Refrigeration or cooling, Lubricity or oiliness, Fluidity, wetting out or penetration, and an Anti-weld characteristic. Secondary functions comprise—control of quality of finish, vehicle for washing away chips, and aid in rust prevention.

1. Flash and fire points—which have a definite bearing on the life of the material and the amount of depreciation due to evaporation under operating conditions.
2. Gumming—a limiting factor which will minimize, if not eliminate, the tendency to gum up parts of the machine tool.
3. Corrosion.
4. Viscosity—according to Prof. Boston, viscosity is not of much importance as far as the action on cutting is concerned, but appears to be of importance from the point of view of oil circulation in the coolant system of the machine, also as an influence in diluting certain ingredients, such as sulfur.

When it comes to judging sulfurized cutting oils, it is found that at the present time there are no accurate tests to indicate the form in which the sulfur is combined. Moreover, different chemical forms of sulfur give different results, so that it becomes exceedingly difficult to judge a sulfurized compound simply by stating its complete sulfur content. The truth of this statement may be realized when we consider that a sulfurized oil may consist of a material which is either sulfur-free in a natural state, or may contain natural sulfur up to about 2½ per cent. This material is then compounded by various proprietary methods to produce the desired percentage of sulfur in some preferred chemical form.

Given the final product, it appears to be difficult at the present time to analyze it and determine definitely the origin of its sulfur content. For instance, a sulfurized product containing 4 per cent sulfur may have only 2 per cent sulfur added, the remainder being the natural sulfur content of the mineral oil. Yet the effectiveness of this product may fall far short of one into which all of the 4 per cent sulfur has been added. It seems necessary to depend to a larger extent upon the integrity of the supplier rather than the skill of the analytical chemist.

Table 1, which was originally published as a part of a recent article in *Automotive Industries*[2], is a good example of the application of the secondary characteristics discussed above. These simple specifications cover the characteristics of the commercial oils most frequently used in the automotive industry.

The present drive on cost has produced intense specialization on the part of suppliers. As a result most of the products on the market are of a proprietary nature and, due to the basic differences in raw materials, methods of compounding, etc., the products which may give the same results in actual service need not necessarily analyze to the same chemical or physical specifications. That's where the differences come in; and that's when we realize the shortcomings of fixed specifications.

Another fundamental weakness of specifications arises from the fact that when a given product is accepted, its maker is asked to give a complete specification of the product, and this is immediately made a regular specification for the purchasing department. Later on, when additional supplies are needed, this specification becomes a par for competitive bids. What happens is, that if a competitive product is chosen simply because it is cheaper, while meeting this specification, it is quite possible that the result in the machine shop may not come up to expectations. Again it is obvious that a test for suitability is the only one that will meet the situation adequately.

By applying some simple tests under actual operating conditions, it is possible to narrow down the number of basic products that need be used, the manner of utilization, degree of dilution, etc., depending entirely upon the individual machine. Then, in judging between competitive products, the service test may be applied. This will make it possible to select the cheapest product which will produce the desired result. Finally, it is evident that in judging competitive products it is absolutely necessary to select reliable sources of supply and depend upon their integrity in honestly supplying the materials which have been accepted on test.

In conclusion, it may be helpful to set down a test procedure which has been found of value in the selection of cutting fluids. Variations of this method probably will take care of most operating conditions.

1. a. Experiment with the strength of mixture, if water-soluble.
   b. Experiment with dilution of mixture, if blended with other products.
   c. Establish the desired surface finish.
   d. Present tool life.
   e. Number of rejects.
   f. Speed of the machine.
   g. Preferences of operators.
   h. Troubles—if any.

2. Then decide definitely which of the following considerations is most important.
   a. Cost of the cutting fluid.
   b. Tool life.
   c. Surface finish.
   d. Productivity.

3. After this preliminary work, cutting tests should be run on similar machines, one with the present cutting fluid, the other with a new cutting fluid. Before starting the test, both machines should be thoroughly cleaned out, equipped with new tools and run at identical speeds and feeds.

4. The final selection of a cutting fluid will be governed by the following factors:

(Turn to page 643, please)

[2] "Choice of Cutting Fluids Simplified by Research," by Joseph Geschelin, Automotive Industries, July 9, 1932.

Heavy Loads Make Accurate Calculation of Needle Bearing Capacities Essential

SINCE needle bearings will practically always be heavily loaded, it is quite essential that their load capacities be accurately calculated in advance. Simple directions for making such calculations are given in a pamphlet recently issued by the Bantam Ball Bearing Co., of South Bend, Ind., which concern some time ago announced that it had entered upon the manufacture of a complete line of steel rollers for such bearings.

In the first place the number of rollers required for a bearing with a certain assumed shaft diameter is calculated by means of the following equation:

$$N = \frac{(D + d) \times 3.1416}{d},$$

where D is the diameter of the shaft or inner raceway, and d, the diameter of the rollers. The solution of this equation is almost certain to be a compound number, and since only a whole number of rollers can be used, the nearest whole number is chosen. The next problem then is to determine the necessary diameters of the inner and outer raceways for this number of rollers. The mean between the diameters of the inner and outer raceways is referred to as the pitch diameter.

In calculating the pitch diameter, use is made of a coefficient K the value of which varies with the number of rollers in the bearing and which may be found from Table 1. The pitch diameter is then found from the equation

$$P.D. = \frac{K \times d \times 3.1416 + C.C.}{3.1416}$$

The circumferential clearance C.C. in this equation can be given a value ranging from a minimum of 0.0001 in. per roller to a maximum of one-fourth the diameter of a single roller. The choice is influenced by the fit desired in assembling. Experience is said to have shown that the omission of one roller from the bearing in most cases does not affect the satisfactory performance of the bearing.

By subtracting the roller diameter from the pitch diameter, the shaft diameter (or diameter of the inner raceway) D is obtained. This diameter should be specified as plus nothing, minus the manufacturing tolerance required, which is usually 0.0005 in. for shaft diameters of less than 4 in.

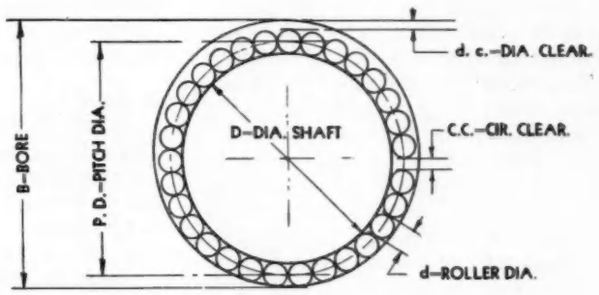


Fig. 1—Abbreviations used in equations

TABLE I
Values of "K"

No. Rollers	Value K	No. Rollers	Value K
10	3.236036	34	10.838034
11	3.549509	35	11.156268
12	3.863689	36	11.474469
13	4.178586	37	11.791250
14	4.493978	38	12.109316
15	4.809773	39	12.427348
16	5.125839	40	12.745348
17	5.442316	41	13.064441
18	5.758710	42	13.381251
19	6.075626	43	13.699154
20	6.392635	44	14.017024
21	6.709479	45	14.334862
22	7.026733	46	14.660235
23	7.344090	47	14.972682
24	7.661074	48	15.290520
25	7.978935	49	15.608326
26	8.296583	50	15.926103
27	8.614006	51	16.243850
28	8.931192	52	16.561564
29	9.248982	53	16.879250
30	9.566632	54	17.199862
31	9.884511	55	17.517599
32	10.202520	56	17.835304
33	10.519702	57	18.152981
58	18.470632	75	23.883449
59	18.788252	76	24.201045
60	19.105846	77	24.518626
61	19.427555	78	24.836174
62	19.744845	79	25.153708
63	20.062479	80	25.471218
64	20.380089	81	25.788702
65	20.697669	82	26.106171
66	21.015224	83	26.423612
67	21.336424	84	26.748188
68	21.654949	85	27.065753
69	21.972565	86	27.383306
70	22.290153	87	27.700831
71	22.607719	88	28.018339
72	22.925264	89	28.335836
73	23.242782	90	28.653295
74	23.560273		

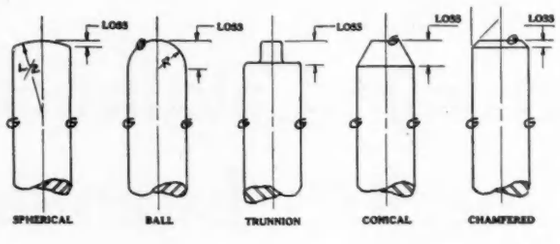


Fig. 2 — Various types of roller ends and the loss of effective length due to them

A proper diametral clearance is of great importance to satisfactory operation of the bearing. On shafts of up to 2 in., the diametral clearance must be held within the limits of 0.0005 and 0.0015 in. This does not include the tolerance on the rollers themselves, which varies between 0.0004 and 0.0008 in. but it does include the tolerances on the inner and outer raceways. In all calculations the upper limit on the diameter of the roller should be used. On shafts of from 2 in. to 4 in. in diameter, the diametral clearance must be held between 0.0010 and 0.0020 in., and on shafts of from 4 in. to 6 in. diameter, between 0.0015 to 0.0025 in. Where there is likely to be distortion of the raceways due to press fits, etc., allowance must be made therefore in the diametral clearance.

The bore or inside diameter of the outer raceway is equal to P.D. + d + d.c. This sum is the lower limit of the value for B, and the higher limit is found by adding the manufacturing tolerance, which amounts to 0.0005 in. for basic diameters up to 4 in. A minus tolerance of 0.0005 in. on the inner raceway and a plus tolerance of 0.0005 in. on the outer raceway are necessary for quiet, efficient operation, and on shafts of over 4 in. diameter a minus tolerance of 0.001 in. may be used on the inner raceway and a plus tolerance of 0.001 in. on the outer raceway.

The length of the rollers to be used is in many instances determined by limitations set by other parts, but length/diameter ratios of from 3 to 10 are recommended. If the ratio is less than 3 there is a tendency for the rollers to cock, and, besides, they are difficult to handle in manufacture and assembly. The Bantam Company has standardized the following sizes and recommends them to users:

Diameter	1/16	3/32	1/8	3/16	7/32	1/4
Length	5/8	3/4	7/8	1	1 1/8	1 1/4

For the length of the rollers limits of minus 0.005 in. and minus 0.015, and for the length of the raceways limits of plus 0.010 and 0.025 in. are recommended, so that the minimum lengthwise clearance for the rollers will be 0.015 in.

Various forms of roller ends are illustrated in Fig. 2. The spherical end is recommended as standard, and the others involve additional cost. Rollers may be held in position endways by any one of a number of different means, such as hardened and ground shoulders on the raceways, hardened and ground loose rings on the inner, the outer, or both raceways; rings pressed into the inner or into the outer raceway, or snap rings in grooves. In any case, the surface against which the rollers abut should be hardened and ground.

If split snap rings are used, the width of the split should not exceed 0.010 in., and the rings should have commercially square edges without burs. It is necessary to grind or polish the rings after they have been split. The diametral clearance of end retainers over the raceways must be a minimum of 0.010 in. and less than one-quarter of the roller diameter.

Any of the usual anti-friction-bearing lubricants will do for the small-diameter roller bearings, but where exceptionally heavy lubricants are used it is advisable to make the diametral clearance somewhat greater than the minimum values given. From present indications, in some installations, such as universal joints, the original lubricant will be sufficient for the life of the car.

While there are many factors which affect the load capacity of a bearing aside from its physical dimensions, such as rigidity of supporting elements, fits of bearing parts, average load factor, temperature variations, etc., the load rating of the bearings is based on the following formula—

$$R = \frac{N \times L \times d \times 11{,}250}{S^{1/3}} \text{ lb.},$$

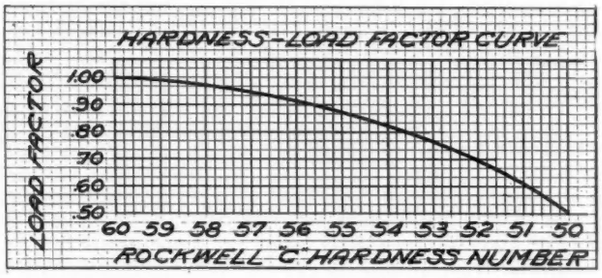


Fig. 3—Hardness correction factor for load rating

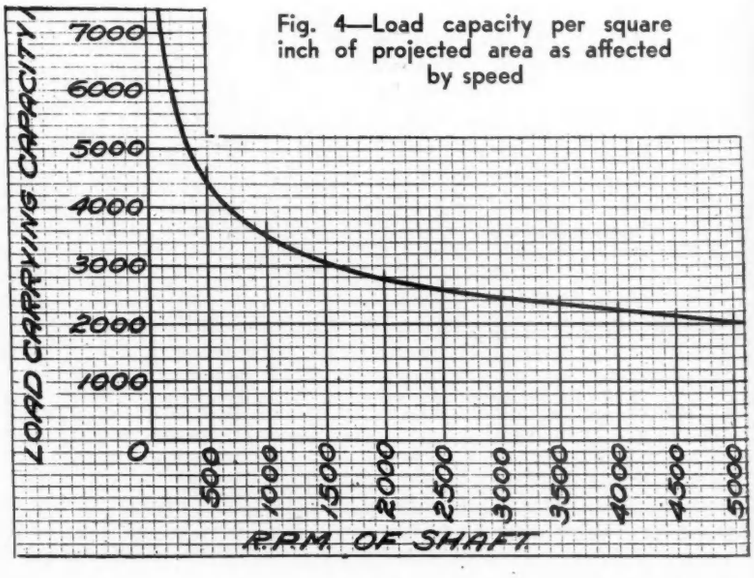


Fig. 4—Load capacity per square inch of projected area as affected by speed

where N is the number of rollers; S, the speed of the shaft in r.p.m.; L, the effective length of the rollers and R the maximum safe load of the bearing. The maximum load which can be carried by a bearing of this type depends on the hardness of the bearing elements. The hardness of Bantam rollers varies between 56 and 60 Rockwell C, and for maximum bearing capacity the inner and outer raceways must have a hardness of 60 or more. If the hardness of either raceway is less than 58, a hardness-correction factor must be applied to the load rating as given by the above equation. This correction factor may be obtained from Fig. 3.

Engineers are in the habit of basing the capacity of a bearing on its projected area. On this basis the load capacity of a needle bearing is as follows:

$$R = \frac{(D + d) \times L \times 35{,}340}{S^{1/3}} \text{ lb.}$$

When desirable for assembly purposes, it is possible to have the rollers "keystone" in the outer raceway, so that when the shaft or inner raceway is removed, the rollers drop by gravity and form their own arch. This feature depends on the combination of the circumferential clearance, roller diameter and inner and outer raceway diameters.

New Japanese Car

The Department of Commerce has been informed that a new small car known as the Datsun, has been introduced on the Japanese market by the Dat Automobile Manufacturing Co., formerly associated with the Tobata Foundries. It has a wheelbase of 74 in. and the open model weighs 880 lb. empty. The engine is a four-cylinder L-head design with a bore and stroke of 2⅛ in. each, which makes the displacement 30 cu. in. The car is said to have a top speed of 45 m.p.h. and a fuel mileage of 50 per gallon. There is no license tax on the car and it requires no driver's license.

Recovery Bill Presents Industry with New Problems and New Opportunities

(Continued from page 634)

would nullify one of the primary objectives of the bill—the expansion of employment.

The question of advertised delivered prices is another subject with which the industry might deal. The majority sentiment has been in favor of this practice for some time but the proponents of the idea have been unwilling to adopt it because of the competitive advantage it might give the dissenting minority. If a code of fair competition was adopted providing for the use of delivered prices in local advertising, the dissenting minority would have to go along.

The industry might also move to standardize equipment included in the advertised list or delivered price. Inasmuch as practically all cars are sold with bumpers, spare tire and cover, and tire lock, there seems to be no reason why these items shouldn't be included in the list price, except that unless all manufacturers include them those who do are at a competitive disadvantage.

Control of clean-up sales is another possibility. They cannot be avoided entirely, but perhaps they could be prohibited during the selling season and confined to the late fall just prior to the introduction of new models. Such an activity probably would require a close watch on dealer stocks to prevent the building-up of unwieldy surpluses.

Some approach to standardization of discounts, at least within the different price classes, and the prohibition of trading allowances except, perhaps, during clean-ups, are other possibilities.

Another aspect of the situation is used car trading. Whether the Recovery Bill would permit local dealer associations to combine to control allowances, is not certain. Unless some control can be exercised along this line, price maintenance within the industry would be not only exceedingly difficult, but probably impossible.

These or other moves by the vehicle makers to stabilize their operation might be expected to react in a manner that would make the position of their supplier somewhat easier. However, the parts, production, equipment and material vendors are given a similar opportunity by the bill to stabilize their operations and to eliminate destructive competition, and it is understood that some classes of suppliers already are moving to take advantage of the Recovery Act.

Suitability Only Safe Criterion in Selection of Cutting Fluids

(Continued from page 640)

a. Increased productivity.
b. Longer tool life between grinds.
c. Stability of the mixture and the length of time it can be used before replenishing.
d. Better surface quality.
e. Relative cost.

In the selection of a soluble oil, the degree of dilution depends primarily upon the balance between refrigeration and lubricity for the conditions established by the machines and the work in question. Marked differences in tool life have been observed with different dilutions and they have not always been in favor of the more concentrated mixtures. The volume of flow over the cutting edge is another factor influencing the effectiveness of the cutting fluid. In general, it has been found that a large volume of solution, not under pressure, is more useful in getting the best results than a small stream, no matter how well directed.

In the selection of sulfurized materials, there is a distinct field of application for the sulfurized mineral oil and the fatty, sulfurized base. By means of careful surface tests it should be possible to establish the minimum amount of sulfur content, this being of major importance since the sulfur content has a direct bearing on the cost of the material.

Alcoholized Fuels Would Cos

by Joseph Geschelin
Engineering Editor,
Automotive Industries

ALTHOUGH more pressing legislative problems apparently will prevent any action by the emergency session of Congress on the five alcohol motor fuell bills now before it, barring a real surge upward in farm prices, their reintroduction at the regular session in January seems certain.

As pointed out recently in *Automotive Industries*[1], fuel prices to the consumer may be increased as much as two to three cents per gallon if alcohol additions to motor fuel are made mandatory through state or federal legislation. In the interim much new data on alcohol mixing have become available from many sources, and will be reviewed briefly in this article. The outstanding facts in the situation are:

1. That the annuel fuel bill paid by the consumers all over the United States would be increased by an amount variously estimated between $400,000,000 and $600,000,000, depending upon the percentage of alcohol in the blend and the prevailing price of grain.
2. That this added tax on the fuel bill would give the consumer no benefits whatever in car performance, engine performance or economy.
3. That the technical difficulties involved, not only in the production of the gasoline-alcohol mixture, but also in its utilization, should be solved before political expediency makes mandatory the use of this special fuel.

Advocates of the so-called Besher plan in the corn belt are pressing the project of converting corn into alcohol as a measure of farm relief. But judging from the cross-currents of comment during the past two months it seems difficult to prove that this measure could actually bring back prosperity or even a tangible measure of relief. New alcohol mixing bills contemplate the addition of three to ten per cent alcohol in gasoline, the alcohol being derived from corn. Since the corn belt is confined largely within the boundaries of six states it is difficult to see how this measure would aid the farmer generally. For example, how would it benefit the Southern cotton planters, the California fruit growers, or the Pennsylvania farmers?

It is not difficult to confuse the issues in a project of this nature. Alcohol additions to gasoline cannot be cited as a measure of conservation of natural resources, since there is no shortage of gasoline. Also because the advances in petroleum technology have resulted not only in a better utilization of our natural resources, but have made possible the production of gasoline from new sources as natural gas.

Nor must we confuse our problem with that of foreign countries which have used or are using alcohol motor fuel mixtures. Practically all countries having laws compelling the use of alcohol in gasoline sold for motor fuel produce negligible amounts of petroleum. These countries are dependent entirely upon outside sources for their motor fuels. Consequently the development of their alcohol industry is a matter of national importance —particularly in case of war. Furthermore, imported gasoline is so expensive as to place alcohol more nearly at price parity with gasoline, which means that the resulting mixture has but a negligible effect upon the price to the consumer. Many countries having no petroleum production have considered laws for the compulsory use of alcohol in motor fuel and abandoned them.

Countries having some type of alcohol motor fuel law more or less actively in force include France, Germany, Italy, Hungary, Jugoslavia, Czecho-Slovakia and Latvia.

The outstanding facts are:—

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[1] "Alcohol Mixing Bills Would Make Motorists Pay for Corn Price Rise," by Joseph Geschelin, Automotive Industries, April 1, 1933.

Our Customers a Half Billion

And at best only some farmers would benefit by bills which would encourage continued over-production

Only the last three require that alcohol be mixed with all gasoline fuels. In France, gasoline sellers must purchase 10 per cent of alcohol but it can be sold only in "heavy grade" gasoline which must contain 25 to 30 per cent. In Germany, gasoline sellers must purchase 10 per cent of alcohol but may sell it to the alcohol monopoly at a reduced price, or may blend it with gasoline provided not less than 20 per cent is used in the blend. In Italy, gasoline sellers must purchase at least 25 per cent of the total production of the alcohol industry but may not sell blends containing less than 20 per cent alcohol.

Another important distinction that must be drawn between foreign practice and the proposals in this country is that foreign practice demands an alcohol industry operating in the interest of greatest economy. This requires not only the most efficient production methods, but also the utilization of the cheapest low-grade, raw materials. In this country it is proposed to use corn, ordinarily a high-priced staple grain, with the expectation of raising its price to 60 cents or more per bushel.

Looking further into the economic situation we find that a ten per cent blend is not feasible, first, because it would demand a greater volume of "cash" corn than is normally produced for the market, and second, because the entire facilities of alcohol distillers at the moment could not handle the volume of alcohol necessary, a matter of at least one and one-half billion gallons yearly.

A two per cent blend which would utilize the entire alcohol producing capacity, would require about 300,000,000 gallons of alcohol. The gross corn take-up of this would be about 120,000,000 bu., at 2½ gal. to the bushel. However, the net take-up or actual removal of corn surplus would be less than 100,000,000 bu. since the "distillers' grain" which the farmer would have to buy back is equal to 40 per cent in food value of corn in its original form.

Opinions differ as to the actual economic relief arising from the use of alcohol in motor fuel. Those supporting the Besher plan claim that it would bring back prosperity. Those opposed to it marshal facts which indicate that the actual volume of corn required could not effect an increase in price for the total volume of corn production. It is evident that these are matters demanding serious consideration and a lot of coordinated thinking. Certainly the whole proposal must stand or fall upon its efficacy as a farm relief measure since it has nothing else to recommend it.

Like other speculative economic discussions, this one is much more complicated than it seems. The only thing certain is that the consumer will have to pay more for the fuel.

Distinction Between Blends

When it comes to discussing the technical aspects of alcohol-gasoline blends, it is necessary to make a sharp distinction between blends containing 25 per cent or more of alcohol and those containing 10 per cent or less. In current discussion there is a curious admixture of the advantages and disadvantages of these two types of blends which has resulted in considerable confusion.

Since we are concerned with blends containing 10 per cent or less alcohol, it is possible to avoid confusion by confining the discussion to the merits or demerits of this blend. From a practical operating point of view, it is said by many investigators that ten per cent or less of alcohol can be safely used without affecting performance in any way. Thus if someone were to fill your tank with this new mixture without telling you about it, you probably couldn't tell the difference. But, by the same token, it doesn't seem safe to claim particular advantages arising from the use of this mixture. For example, it has been claimed that a ten per cent blend has an anti-knock rating equal to that of premium fuel. Can this be substantiated in the face of Bureau of Standards work which indicates that the anti-knock value does not become apparent except with mixtures containing 15 per cent or more of alcohol? (See Technical News Bulletin No. 191 of the Bureau of Standards.)

This publication also states that alcohol fuels may be corrosive to certain metals used in fuel tanks and fuel lines, although not sufficiently so to prevent the use of such fuels in cars as they are now made.

While the use of alcohol-gasoline fuel mixtures appears to present no difficulty in actual operation, some serious problems are involved in production and distribution. In the first place it is well established that the most economical blend is one containing anhydrous alcohol, having only a fraction of one per cent of water. Alcohol distillers assure us that there will be no difficulty in producing a product of this type. The chief precaution to be observed, and one which does not seem to be serious, is that of selecting denaturants which are not harmful to the gasoline engine and its fuel system.

By far the most serious difficulty, and one which is viewed with great concern, is the tendency for an alcohol-gasoline mixture to separate into distinct layers in the presence of certain amounts of water and also under low temperature conditions. According to the findings of the Bureau of Standards, "When alcohol is mixed or blended with gasoline, there is for each blend some temperature below which the mixture will separate into layers; the upper layer being mainly gasoline, the lower layer mostly alcohol. The smaller the proportion of alcohol in the blend and the greater the content of water in the alcohol used, the higher will be the temperature of separation." The following figures are from the U. S. Bureau of Standards on the temperatures at which various 10 per cent mixtures of alcohol and gasoline separate on cooling; these are average results of eight different gasolines.

Water in Alcohol per cent.	Separation Temperature Deg. F.
1	−50
2	8
3	48
4	81
5	111

Thus while there is no problem involved in the mixing of alcohol with gasoline, provided anhydrous alcohol is used to maintain stability, the tendency of the mixture to separate in the presence of water accumulations in the fuel system does constitute a real hazard. This angle of the situation has come in for considerable study during the past few months. We quote below from a report by the chemist of the Keystone Steel & Wire Co. operating over three hundred automobiles on a 10 per cent blend of alcohol and gasoline:

"We feel that the question of absorption and separation with water has been greatly over-stressed by those opposing the plan. We have a 15,000 gallon storage tank from which we are dispensing gasoline. A sample is taken every day from this tank and tested for water. This is done by cooling the blended fuel to a temperature 35 deg. F. below zero. A number of samples have been cooled to 65 deg. F. below zero. No separation due to water has been found. A sample of gasoline was taken from the fuel tank of an automobile which had been operating 11 days. Three of the 11 days were very wet, raining practically all of the time. There was also a change in temperature from hot to cold and cold to hot. The conditions of the test were ideal for condensation of moisture and the absorption of moisture from atmosphere by the blended fuel. The sample taken was cooled to 35 deg. F. below zero without any separation of the gasoline and alcohol."

Whether or not the foregoing report may be accepted as the final answer is a moot question. Remember that we are dealing with a problem of national distribution which involves the shipment of anhydrous alcohol from the alcohol distiller to the petroleum refiner. This alcohol will have to be stored until it is blended, then the mixture stored prior to shipment by tank car and truck. It is difficult to prevent the accidental presence of water in this complex system of gasoline transportation and distribution, before finally the fuel finds its way to the storage tanks at various local distributing points, in the plants of fleet operators and at the corner gasoline stations.

Moreover there is the ever present possibility of water entering the fuel system of the vehicle in operation. While it may be claimed that these are not insurmountable obstacles, the magnitude of the undertaking is evident and steps would have to be taken at every stage of the process to exclude water. This may mean additional expense if it is assumed that the problem is soluble.

Further technical evidence including the results of recent test work is found in the paper[1], read recently by Dr. G. G. Brown of the University of Michigan. These data take the discussion of alcohol-gasoline blends out of the realm of pure conjecture or political expediency and place it on a sound engineering basis.

Now for some of the available alcohol cost details. According to figures presented by L. S. Bacharach, a former alcohol manufacturer: "The total of all manufacturing, denaturing, sales and overhead charges for the production of water-free alcohol from corn is about 13.6 cents per gallon of alcohol. The total of interest, depreciation and profit, allowing 10 per cent profit on the investment, is about 7.2 cents per gallon, or a combined total of 20.8 cents per gallon. To this must be added the cost of the corn on the farm plus the cost of transportation to the distillery. The credit value of the by-products must be deducted. For the production of one gallon of alcohol about 35/100 of a bushel of corn is required, plus about 6/100 of a bushel of malt. As nearly as can be estimated for future large scale production, the cost of malt per bushel would be about twice the price of corn."

"If the price of corn on the farm were 25 cents per bushel, then the raw materials cost would be about 12 cents per gallon and the freight cost for transporting these raw materials to the distillery would be about 2.5 cents per gallon. This gives a total cost, without credit for by-products, of about 35 cents per gallon of alcohol.

"If the price of corn on the farm were restored to a normal level of 50 cents per bushel, then the raw materials cost would be about 23½ cents, tranportation 2½ cents, and the total cost without credit for by-products 47 cents."

One of the largest alcohol distillers in the United States producing anhydrous alcohol in large quantities at the present time, tells us that if corn goes to 60 cents, the cost of anhydrous alcohol would be 40 to 45 cents per gallon. In a three per cent mixture this would amount to an increase of 1.2 to 1.35 cents per gallon of motor fuel.

More About Costs

Another slant on the matter of cost is found in the following quotation from recent correspondence with the U. S. Department of Agriculture:

"The operating cost of the production of alcohol is quite definitely known. In large production, alcohol can be produced from molasses (the cheapest raw material now available) at an operating cost of about 6 cents and from corn at about 7 cents per gallon of alcohol. To this amount is added the price of the raw material to obtain the net cost. With molasses at 5 cents per gallon (two and one-half gallons molasses yield one gallon alcohol), this would mean that the alcohol would cost 18½ cents, but this does not include the distribution, denaturing charges, and profit. The cost of producing a gallon of alcohol from corn (a bushel of corn will yield 2½ gallons of alcohol) is greater than producing it from molasses, since the 'mashing' and fermenting of the corn is a more costly operation than merely diluting and fermenting molasses. We have been advised

[1] "Agricultural Alcohol in American Motor Fuels," by George Granger Brown, Third Mid-year Meeting, American Petroleum Institute, May 18, 1933.

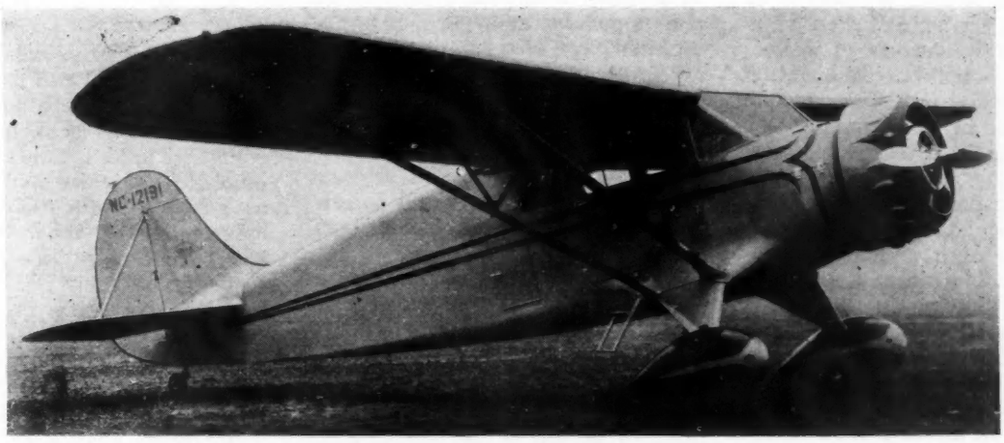
recently by representatives of the industrial alcohol industry that a fair charge to cover distribution, denaturing and profit would be from 8 to 10 cents per gallon, to which should be added 1½ to 2 cents for dehydrating in order to obtain the 99.6 per cent alcohol which is necessary if it is to be used as motor fuel. These charges will vary of course with the individual plant, depending upon availability of raw materials and efficiency of operation. This means that dehydrated alcohol can probably be produced, if there is sufficient demand for it, at a cost of between 30 and 35 cents per gallon.

"Anhydrous alcohol is quoted today in tank car lots at 50 cents per gallon. It is believed that it cannot be produced for much under 40 cents per gallon even in larger quantity production."

Study of available literature indicates that while the cost of producing alcohol is pretty well known, it is difficult at the moment to establish its exact effect upon the cost of the alcohol-gasoline blend. The difference arises in the additional cost occasioned by an increased number of handlings such as between the distillery and the petroleum refiner or mixing plant, also the actual cost of making the mixture. Another factor of uncertainty will be the effect of fluctuating prices of the grain which is bound to introduce a certain amount of instability in the present price structure of motor fuels.

Finally, no one can predict at the moment the net effect of "distillers' grain" or mash which must be thrown back on the market. Remember that in calculating the cost of producing anhydrous alcohol it has been assumed that the distiller will be credited with a definite minimum price for distillers' grain. If this were not absorbed, the price of alcohol would jump alarmingly above the figures quoted here.

The foregoing is intended simply as a brief comment upon the current information available on this subject. We are presenting these details at their face value and in a perfectly impartial manner. While no attempt has been made to place any particular interpretation upon these data, it is obvious to any fair-minded observer that there are a number of serious questions involved which must be solved before any form of legislation is attempted.



Stinson Offers New 4-Passenger Plane

STINSON Aircraft Corp., Detroit, Mich., has introduced a new four-passenger model, the Reliant, which succeeds the Model R. The new model is offered at a price of less than $4,000, as compared with $5,995 for the Model R.

An outstanding feature of the new model is a new cantilever streamlined landing gear; the leading edge of the wings is dural-covered; stainless steel, spot-welded, is used for the wing ribs, ball bearings are fitted throughout the control system, and there are rubber shock-absorbing bushings in the engine mounting. The engine is a 215 hp. Lycoming. It is equipped with a direct-drive 12-volt electric starter and with an adjustable metal propeller. Numerous refinements have been made in the Lycoming engine which now has stronger link rods, forged pistons and a heavier crankshaft.

The landing gear has been widened for safer landings and is equipped with semi air-wheels, self-energizing brakes and fenders. The outriggers serve as a housing for Aerol strut shock absorbers. The tail wheel is also streamlined.

A V-type windshield and two additional side windows increase visibility. Safety glass is used in the windshield. There are numerous interior refinements, including deeper seats, increased leg-room for the pilot, and indirect illumination of the instrument panel. A package compartment is provided in the dash, the same as in 1933 automobiles. A new baggage compartment opens from the outside of the plane and is furnished with lock and key.

Specifications

DIMENSIONS

Span	43 ft. 3⅛ in.
Length Overall	27 ft.
Height Overall	8 ft. 5½ in.
Wing Chord	75 in.
Dihedral	1½ deg.
Wheel Tread	10 ft.

AREAS

Wings including Ailerons	235 sq. ft.
Ailerons	29.7 sq. ft.
Stabilizer	23.7 sq. ft.
Elevator	17.1 sq. ft.
Fin	7.63 sq. ft.
Rudder	12.21 sq. ft.

WEIGHTS

Gross Weight	3125
Weight Empty	2040
Useful Load	1085
Pay Load	585
Oil—4 gallons	30
Gas—50 gallons	300
Baggage	75
Wing Loading	13.3
Power Loading	14.54

Performance with Full Loads

Rate of Climb	750 ft. per min.
Service Ceiling	14,500 ft.
Maximum Ceiling	16,500 ft.
Cruising Speed	115 M.P.H.
High Speed	135 M.P.H.
Landing Run	250 ft.

Buyers Remember the "Bugs"

(Continued from page 637)

ample reasons from the standpoint of self-protection and market stability for manufacturers to make every correction of faulty design as quickly and forcefully as possible.

The troubles which beset the dealer with the offering of a new model, and the discovery by the car owner that it is not giving him acceptable service may be divided roughly into two classes. There are minor troubles which can quickly be corrected, often by the dealer himself, without recourse to the factory engineering department. At most, their correction may involve the substitution of a small part, the issuance of a factory service bulletin describing some particular adjustment, and perhaps making the change the next time the car comes to the dealer (during the guarantee period) for inspection. Sometimes the change can be made without the owner's knowledge, or may involve only the possible difficulty of selling him on "putting in the latest change" without charge, or for minor cost. In such cases, it is even possible for the dealer to increase customer good will by advising him of the desire on the part of the factory to "bring his car up to date" by installing the corrected unit as soon as convenient to him.

If minor troubles become manifest soon after a new model reaches the market, none aggravate car owners more than repeated trips to a dealer for repetitive corrections. In such cases, the dealer is "on the spot" until remedial measures of a permanent character are taken. While a car owner may be "bluffed" for a time by deprecating the seriousness of any fault, this quickly becomes an "old story."

In this classification of minor troubles may be included leaky water pumps, erratic action of the ignition system, fan and fan belt wear and frequent adjustment, engine overheating, lubrication difficulties, involving the substitution of pressure regulators or their readjustment, rattles, body noises, improper ride control or shock absorber action, even defective tire inner tubes (porosity causing too rapid deflation) and a host of other items, none of which "amount to much" from a design standpoint, or in fact may be entirely problems of manufacture in that they involve lax inspection, use of an improper type of lubricant by factory or dealer, faulty assembly methods, etc.

The second group of "troubles" may consist of those really requiring an important alteration in design, followed by expensive dealer campaigns if the new parts are to be installed in cars already in use. Such difficulties as breakage of rear axle shafts, wherein substitution of a better material is insufficient and important axle parts must be replaced or altered, leakage or cracking of cylinder heads or blocks, clutch and transmission failures, use of too "cheap" a material in a unit requiring appreciable labor to remove and replace, valve warpage or too rapid deterioration, etc., may be included in this group.

From the table itself, but more particularly the data on which it is based, it is possible to draw a number of definite conclusions:

(1) New car buyers very quickly recognize the appearance of defects of car design and construction, whether or not they are capable of discerning the cause or the exact engineering reasons therefor.

(2) Information concerning car service troubles is quickly disseminated to other car users and prospective car buyers. When the advertising and publicity announcing a new model has drawn special attention to it, the time that knowledge of defects becomes general is materially shortened.

(3) Unless the factory takes immediate steps to assure dealers that it recognizes an error in design or manufacture has been made, and makes corrective measure promptly, the time required for the public to be "resold" is materially increased, far out of proportion to the time required for making necessary changes.

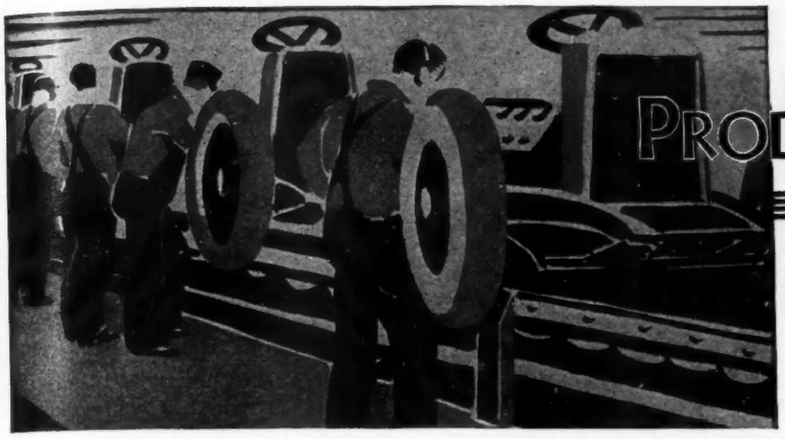
(4) Conversely, if the factory promptly makes corrections and puts through a forceful remedial campaign to dealers and owners, the time required to regain good-will can be decreased until it is little longer than that required for completing the necessary changes.

(5) The greatest danger from losing public acceptance lies in having several faults in a model appear almost simultaneously, thus giving the owner the feeling that "my car is always in the shop when I need it."

The automotive adage that "a market once lost can never fully be regained" may have had its inception, in part at least, in the knowledge that unless manufacturers are quick to recognize and as frankly as possible admit they sometimes make mistakes, then do something about their sales, are going to be reduced and their income also decreased. Not only this, but they must also recognize it is going to take months, even years, before they can again be sure there linger no thoughts about past defects which make selling more difficult. There has been no greater need than that now existing for the closest tie-up between the car owner, the dealer, and the factory service and engineering departments, for the foregoing as well as other reasons.

Fiat Increases Output

THE Fiat Works paid a dividend of 10 lire per share for the year 1932, the funds for which were taken from surplus. In the directors' report it was stated that in spite of the depression in the world's automobile industry, Italian automobile registrations increased by 24 per cent over 1931, and domestic sales made up for loss in the export business of the Fiat company, enabling it to close the year with a slight increase in the number of units produced and equaling the tonnage production of the previous year.



PRODUCTION LINES

Rubber Wins

B. F. Goodrich laboratories report on a series of tests on industrial tractors shod with metal wheels and rubber-tired wheels. The idea was to see the effect of wheel equipment upon the life of floors in warehouses, loading platforms, and factories. Rubber tires won. The rubber-tired wheel, after being run continuously on a concrete disc for 46 hours, had no effect on the concrete either at the joint or on any part of the surface. The metal wheel broke the concrete both at the expansion joint and the standard joint section, in 44 minutes.

Cheerful Assurance

Autocolor, Spring and Summer, 1933 is the Ditzler contribution to automobile designers. Frank S. Spring of Hudson, a contributor to this issue prophesies that the public will like simple, one-color combinations that harmonize. New colors must be in shades which uplift rather than disturb, the spirit; they must look good even when coated with road dirt. So Ditzler suggests six colors—Cordbeige, Oystershell, Baden Green, Apple Red, Copperust, Matelot Blue—each in four values from No. 1 light to No. 4 dark.

On the Job

Understand that there will be no national machine tool exposition this year. So once again, automotive production executives will find the exhibition of manufacturing equipment in the Production Issue of *Automotive Industries*. Not only do you get the latest dope but it's edited to show only the equipment of particular interest to automotive manufacturers. The Fall issue is well worth watching for.

Cutting Down

Simplified practice recommendation, R45-32, on grinding wheels (fourth edition) is off the press. You can get your copy from the Superintendent of Documents, U. S. Government Printing Office. It's a handy handbook giving types and forms of grinding wheels, also an accepted range of sizes. An interesting section of the bulletin is an alphabetical list giving a standard nomenclature for various classes of work in the grinding field.

Shattered Idols

An advertisement by the Hydraulic Brake Co., scheduled for a coming issue of *Automotive Industries* breaks one of our firmest beliefs. It says, by way of debunking, that NO, the ostrich does not poke his head in the sand to elude pursuers. What simile can we use now?

Standardization Costs

An estimate made several years ago by the Department of Commerce placed the cost of standards work on the part of associations and the government at eight million dollars annually. The entire expenditure of the American Standards Association today is only about one per cent of the gross estimate. For those who may be interested in other statistics concerning the activities of the ASA, it has prepared a little booklet, "Does Industry Need a National Standardization Agency?" which is yours for the asking.

ASA Yearbook

The Annual ASA Yearbook is off the press. It gives in index form, the approved standards as well as uncompleted projects, also a complete list of pending projects. This index is a tribute to unceasing accomplishment in one of the most important of industrial activities.

Another One—

Heard at the last meeting of the A. W. S. was the term, PSI. True, the Greeks have a letter for it but certain structural engineers like it as short hand for—"pounds per square inch." Instead of writing 15,000 lb./sq. in., they seem to prefer, 15,000 psi. Interesting even if it doesn't jibe with the way we're accustomed to doing it.

More Diesel

A. W. Childs, chief, automotive division, Bureau of Foreign and Domestic Commerce, tells us that he has some copies available of a survey he just completed of world usage of diesel engines in transport work. He turned the spotlight on every corner of the globe including —Iraq, Siam and Singapore. You're lucky if you get a copy before the supply runs out.

Metal Structure

Francis Bitter of W. E. & Mfg. Co., reveals an alluring field of investigation of the structure of metals by magnetic technique. It's all in *Mechanical Engineering* for May, 1933. Magnetization yields an entirely different picture of structural pattern, grain boundaries, slip lines, etc., from that revealed by X-ray. The method consists in applying a few drops of liquid containing a fine powder such as Fe_2O_3 in suspension. A liquid such as alcohol or ethyl acetate has been found very satisfactory. When the specimen is magnetized, the powder settles almost instantly in those regions where the magnetic field is strongest. Aside from the practical result of locating flaws, the interpretation of the new structure is bound to be of great interest.—J. G.

MANUFACTURING MANAGEMENT METALLURGY

The FORUM

Buried in the Seat Cushions

Editor, AUTOMOTIVE INDUSTRIES:

With regard to current body trends in automobile design I would like to discuss three salient points.

1. I agree wholeheartedly with the comments expressed in some of your recent articles that the present bodies, especially in the lower price classes, are uncomfortable and have poor visibility. Side visibility is further diminished by ventilation systems brought out the past year. Then too, the split in the side windows is certainly not conducive to safety. One has only to stand along a well-traveled street and count the battered, dented and otherwise damaged right front fenders to understand the mishaps occurring from poor visibility on the current models. When sitting in a closed model one has the feeling of being "buried" in the seat cushions. It is much the same as sitting in a cheap, overstuffed piece of furniture, the springs completely compressed and being anything but comfortable, as compared with a more expensive chair that keeps your back erect and is able to sustain your weight without "flopping." This is especially noticeable when trying to park. In the more expensive cars this condition is not as prevalent due to better materials and to the fact that the designer has a wheelbase to work with to better advantage.

2. The second point is that the individuality of the car is lost in the current trend toward standardization of design. All have V-radiators, hood-lines and cowling are the same and there is little difference between even details of different makes. The day is past when a person could look up the street for two blocks and tell at a glance the make of car approaching. European manufacturers have clung to their traditional radiator and hood designs and who will say that they do not have appearance? Individuality is not lost to passing fads. The buyer can exercise a choice.

3. This is tied in with point No. 2 and concerns the individuality of the buyer. A person desiring to purchase a car of a certain make, in let us say the $4,000 dollar class, will dislike the fact that exact duplicates of such a car (differing only in size) may be had from $2,000 dollars up to and above $6,000 dollars. In other words, when a manufacturer spreads his sales into different price fields, after building up a reputation in one field, is it advisable to model the cars of all fields on one fixed design? Perhaps this will explain the switch from one make to another on the part of the buyer, during recent years in effort to be individualistic in his choice. However, we are approaching the era when a manufacturer no longer builds for one price field alone but invades as many fields as possible, which leaves the public no choice at all except in custom-built models beyond the ordinary price range.

It would seem that even if a certain amount of grace in body contours is sacrificed at the cost of enhancing the individuality the buyer will become attracted by this very difference.

CHARLES A. SUPIOT,
Mechanical Engineer.

Cheers Instead Of Jeers

Editor, AUTOMOTIVE INDUSTRIES:

In your issue of April 8, appeared an article entitled "Three Jeers At Some Recent Body Trends," which, after considering for two weeks, still in my estimation deserves a "rise" for someone.

I am 6 feet 4½ in. tall and weigh 230 lb. I have legs long enough for a man 7 feet tall and a correspondingly shorter trunk, which would about correspond with the dimensions of Mr. E. B. White.

My wife is 5 feet 3½ in. tall. We both fit comfortably in a 1933 Chevrolet Master 6 Coach, and both drive it in comfort. I not only, like Mr. Hewitt, have "attempted" to get into all the lower priced cars, but have gotten into them and driven them.

Mr. Hewitt summarizes his difficulties in 6 points. Let's take 'em in order as he listed them.

1. I have never had any training as a contortionist but can get into any car I ever saw easily. Of course, all my joints are in working order, my neck will bend, and I don't expect to walk in like I would through the door of my office.

2. Here we'll have to give in, for while the writer personally, has plenty of head room, a little more, possibly 1 inch, would suit most people better.

3. Visibility is, in my experience, as good now as it has ever been in the last 15 years.

4. What do you want to see the fenders for? It seems to me that any one who has driven automobiles 29 years, should know how wide his car is. If you *have* to see the fenders, how do you back into your garage?

5. The only advantage to being able to see the road 5 feet or less in front of the car, would be in looking for quarters or dimes, or possibly counting the cracks in the pavement. Any man who has driven a car one week, should know by the "feel" where his front bumper is located.

6. On "gadgets" I more or less agree with Mr. Hewitt. I would list as useful such things as "synchromesh" transmission, "Starterator," thermostatic water control, etc. Among the useless and unnecessary things I would list free wheeling, automatic choke, automatic clutch, "dual high," etc.

As stated previously, I believe my eye-level, when sitting in the average car would be about that of Mr. White's. I find on measuring, that my line of vision comes exactly in the center of the windshield; also I am able to expectorate with facility. As to his statement about the rich old girls; I have a grandmother who can't see her own feet,

or lace her own shoes. She has to be helped into a car like a grand piano. I would not consider such a person as an average, supple, healthy human being. Tell the rich old girls to either diet or buy a truck!

LAWRENCE E. BACON
(Industrial Engineer)

Would Exchange Activity for Economy

Editor, AUTOMOTIVE INDUSTRIES:

I wish to congratulate you on Mr. Heldt's article in *Automotive Industries* of April 15, on lowering the rear axle ratio of automobiles.

I hope to be in the market for a new car within the next half year, and even before your article appeared, I had decided that if it were at all practical, I would get a car with a somewhat lower ratio than the maker supplied as standard. Not having at hand any engineering data as to the effect such a reduction would have on car activity, I had in mind a reduction of the order of 10 per cent. In view of the data you presented in your article, I am now inclned to approach your suggested reduction of 20 per cent.

In view of the economies which such a reduction would afford, I feel that the limitation of the car's activity, i.e., acceleration, is a minor matter. To me, the reduction in motor wear, and also its noise, at high speeds in particular, is fully as important as the economy affected in gasoline and oil consumption.

Mine may not be a typical attitude, but even though I am still fairly young (age 27), excessive competitive acceleration means practically nothing to me as compared with its lure a few years back. My attitude is, admittedly, colored by economic experience of the last few years. My opinion is, however, that present conditions will improve so gradually that, for a large number of persons, anyway, the fundamental considerations of economy and efficiency (as well as *fundamental comfort*—as opposed to mere psychological thrill or satisfaction), will be accorded considerable weight for years to come.

HERMAN P. ROTH

Wider Rings to Reduce Cylinder Wear

Editor, AUTOMOTIVE INDUSTRIES:

I have been very much interested in two recent articles appearing in *Automotive Industries* the first in issue of April 1 entitled "Skirt Wear Not to Blame," the second in issue of April 8 entitled "Ricardo Has New Theory to Explain Concentrated Wear of Cylinder Bore." I have observed the concentrated wear on cylinder bore for a considerable length of time. Apparently it increased about the time the use of aluminum pistons became more general and there was an inclination to ascribe it to the use of aluminum in place of cast iron. However, on giving the matter more thought recently, I have about come to the conclusion that it is due to the pressure of the rings on the cylinder wall and more particularly to the pressure resulting from the gas pressure in the combustion chamber rather than any pressure on account of ring tension.

Inasmuch as it would appear that the total pressure against cylinder wall would vary directly as the width of the ring (this for the top compression ring), a wider top ring would, of course, assert a greater total pressure against cylinder wall, but on the other hand I believe that the load carrying capacity of the oil film between the ring and the cylinder wall would increase at a greater rate with increase in width of ring than with the width of the ring, that is to say, doubling the width of the ring would much more than double the load carrying capacity of the film between ring and the cylinder wall. Thus a relatively small increase in width of the ring might result in an oil film which would sustain the gas pressure load to prevent the ring from contacting the cylinder wall.

We are making an installation in which cylinders No. 1 and 4 will be equipped with ⅛ in. top compression rings while No. 2 will be equipped with 3/16 in. ring and No. 3 with a ¼ in. ring.

S. B. SHAW,
Automotive Engineer,
Pacific Gas and Electric Co.

Editor's Note: *Automotive Industries* hopes that Mr. Shaw will report on the results of his tests.

Thought He Was In a Cell House

Editor, AUTOMOTIVE INDUSTRIES:

Referring to an article you wrote, "They Look Good But"—in your April 1 issue of *Automotive Industries* I wish to say "Them is my sentiments exactly."

I have inspected several of the 1933 car models and in practically every case when I sat behind the wheel I thought I was in a cell house, the all around vision was so poor. I am a normal sized man, yet all I could see when sitting in the new cars was a monstrous hood and in some cases only the radiator cap. The front pillars also are very thick on new cars, obscuring the vision.

I think new cars are a menace to safety. If I were to buy a new car this year I would not be satisfied with any of them. The salesmen say a person will get used to driving blindly with a big hood stuck in his face but I don't believe it. I would prefer a car with a short low hood such as is found on the new rear engined cars so I could see where I was going.

I believe that comfort and safety have been greatly sacrificed in the 1933 cars to get stylish lowness. Let us see what the industry will do about it.

Yours truly, WM. F. LYON
Research Engineer, Federal Oil Co.

NEW DEVELOPMENTS

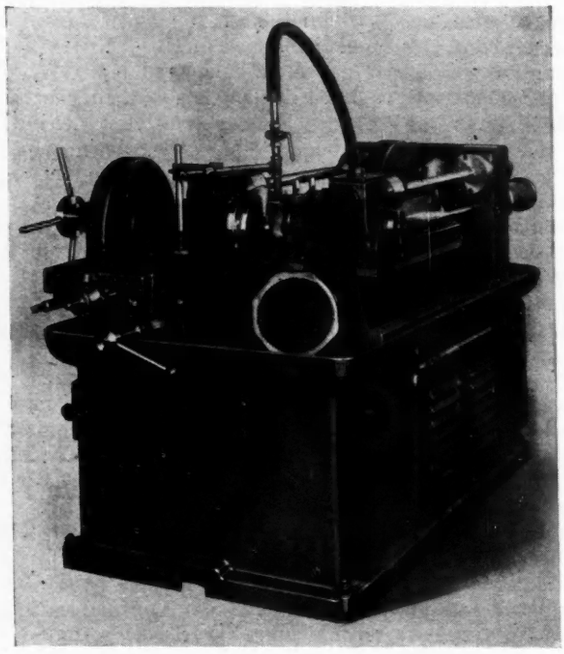
Automotive Parts, Accessories and Production Tools

Aircraft Engine Cams Milled Automatically

To supplement the line of cam milling machines which are designed for milling one or two pieces from the same master cam, The Producto Machine Co., Bridgeport, Conn., has brought out the No. 12½ machine which is adaptable to many automotive applications. It is made with two cutter slides and one work slide so that two paths, surfaces, or contours, can be milled on the same piece simultaneously. Separate master cams are used to control the action of the cutter slides so that if necessary different forms or contours can be produced on each of the paths on the same piece of work.

The job illustrated is a four-lobe timing cam used on radial engines. This cam is about 10 in. in diameter by ⅝ in. wide and has two paths, or surfaces, to be milled—one for the intake and one for the exhaust, each path being ¼ in. wide. The surface is milled from a rough forging. A very smooth finish must be produced ready for hardening and finish grinding. Production—one piece complete in seven and one-half to eight minutes.

The machine is mounted on the regular standard cabinet base which has overall dimensions of 74 x 44 in. The super-structure consists of a large bed machined in three places to take two cutter slides and one work spindle slide. Each cutter spindle slide is 28 in. long by 12 in. wide and has a box type of slide with adjustable gibs. The spindle is made of alloy steel, hardened and ground all over. It is driven by a worm and worm gear which derives its power from the main gear box of the machine. The reciprocal movement of the cutter slides while the work spindle is making one revolution produces the exact form of the work.



New Producto No. 12½ milling machine

Takes the Kick Out of Monoxide Poisoning

A recent advance in medicine, significant enough to make national news headlines, is the fact that Methylene Blue makes an effective antidote for carbon monoxide and cyanide poisoning. No previous satisfactory antidote has been known.

The Methylene Blue is administered into the veins in a 1 per cent aqueous solution, to the amount of 50 cc. Repeated use of this generous dosage since its first successful use at the Park Emergency Hospital, San Francisco, on September 5, 1932, has authenticated its effect on both cyanide and carbon monoxide victims.

Acting on this timely knowledge, William H. Rorer, Inc., pharmaceutical chemists, 265 South Fourth Street, Philadelphia, Pa., have prepared a 50 cc. sterile ampul of the Methylene Blue 1 per cent aqueous solution, which is offered to industries, hospitals and doctors.

Any Speed With This Reducer

An infinitely variable speed reducer incorporating the overrunning clutch principle has been placed on the market by The Smith Power Transmission Co., Cleveland, Ohio. The out-put speed ranges from 0 to 240 r.p.m. For ranges about 240 r.p.m. a step-up drive can be used on the out-put shaft. Speed changes to the driven shaft are accomplished by changing the stroke of the five arms attached to the one-way clutches. This change is made by a simple variable throw crankshaft, arrangement controlled by the hand lever.

The unit is composed of five one-way overrunning clutches. Transmitting their power in uniform cycles to a centrally mounted driven gear. Drive from the out-put shaft either with a coupling, sprocket and chain, or any available type of drive.

Capacity ranges from 1 hp. up. The 1 hp. unit is equipped with a lever control locked in any position with a small hand wheel. There is also a visible dial indicating the desired speed of the out-put shaft. The units are designed to be operated with a 1200 r.p.m. motor.

Nolap Abrasive Sleeves for Portable Grinders

A complete line of interchangeable abrasive sleeves for portable grinders has been placed on the market by The Cleveland Container Co., Cleveland, Ohio. This "Nolap" line is said to cover the gamut of applications required by the automotive industry, such as the finishing of small molds, body dies, stainless steel stampings, forgings, etc.

These sleeves are preshrunk, strong cloth backing coated with abrasive material according to the modern methods wherein all variables are said to be under control. The abrasive material is wound spirally in special precision machinery so that the finished sleeves offer no projecting joints or depressions to pound the work. Thus, the even contact so necessary between the wheel and the work is assured. The sleeves are reinforced so that they remain true to shape without stretching. Ravelling at the edges also is eliminated.

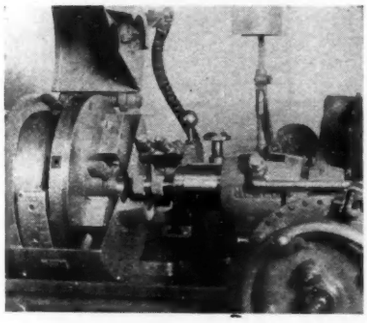
"Nolap" abrasive sleeves for portable grinders are made in all grits and in all sizes from ¼ to 6 in. in diameter and in any length. Heat resisting expanding rubbers on which the abrasive sleeves are mounted, are also supplied.

NEW DEVELOPMENTS
Automotive Parts, Accessories and Production Tools

Internal Grinding With Two Wheels

An automatic internal grinding cycle with two wheels on a single spindle, designed to answer fine finish requirements, has been placed on the market by The Heald Machine Co., Worcester, Mass. It combines the well-known features of the Sizematic and Gagematic principles.

Two different applications are described here; one a set-up for removing large amounts of stock with a fine finish, the other a set-up for very fine finish necessitating a polishing operation on a connecting rod big end.



The first machine carries two grinding wheels, one for rough grinding, the other for finishing. It is arranged as a single gage, Gagematic, having the truing contact on the handwheel, Sizematic fashion, and the finishing contact in the plug sizing device. The sequence of automatic operations is as follows:

1. Start.
2. Rough grind, using rear wheel.
3. True both wheels, and set dog bar for finishing.
4. Finish grind, using front wheel.
5. Run out, resetting dog bar.

Truing is controlled in the usual way, but when the table runs out for this purpose the lever carried on the right-hand end of the dog bar rides over a cam, which raises the latches on the stroking dogs by means of a rack and pinion. At the same time other latches drop into position to allow the finishing wheel to grind.

Finished size is controlled in the usual manner by a gage. A special retraction mechanism is incorporated in the plug sizing device which keeps the gage retracted away from the projecting wheel during rough grinding.

Since roughing is done by the rear wheel, some arrangement is necessary to back off the cross-slide when the table runs out for truing, to prevent the front wheel from striking the ground surface. This is similar in principle to the standard type of backing-off attachment.

Where stock conditions are severe, the method and arrangement described allows maximum production to be obtained, by permitting the selection of a relatively coarse, free-cutting wheel for roughing, with a fine, hard wheel for finishing.

In the second case, the best possible finish was desired; as nearly mirror-perfect as could economically be produced. Stock was more nearly average. A variation of the arrangement just described was applied, a double gage machine being used. Roughing, truing and finishing are done in the normal Gagematic manner with the front wheel, under the control of roughing and finishing gages. When the finishing gage enters the work, a valve in a secondary control box is actuated, which allows oil to enter a hydraulic cylinder at the right end of the dog bar, moving the whole dog bar endwise. This brings the rear wheel into grinding position. At the same time the gages are retracted out of the way of the projecting wheel and a time relay is started.

The rear, or polishing wheel, is of cork, impregnated with abrasive, and is allowed to float back and forth in the hole under very little feed or none at all, until the time relay makes contact, when the table runs out in the usual way. As in the previous arrangement, it is necessary to back off the cross-slide at the time of running out to prevent the front wheel from striking the hole. This is accomplished by a conventional backing-off attachment, hydraulically operated.

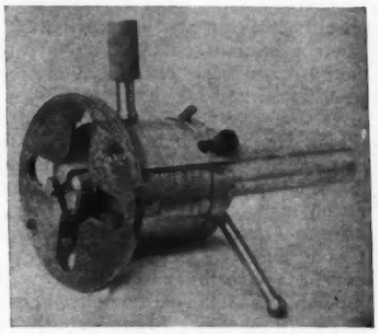
The sequence of automatic operations is as follows:

1. Start.
2. Rough grind, using front wheel.
3. True both wheels.
4. Finish grind, using front wheel.
5. Shift dog bar and polish, using rear wheel.
6. Run out, resetting dog bar.

Where stock conditions are approximately normal it produces a finish very nearly as smooth as that obtained by lapping, at the same time maintaining close tolerances for roundness and straightness.

Collapsing Tap

A sensitive-tripping tap, known as Class PS, has been developed by the Geometric Tool Co., New Haven, Conn. This collapsing tap has been developed for two purposes: (1) To handle a wide range of work on shallow depth tapping; that is, short thread lengths; and, (2) to handle work where it is necessary to clear obstructions or projections at the bottom of the hole. The first class of work covers such items as shallow-



Geometric Class PS Collapsing Tap

depth caps, thin wall tubing or any shallow depth, fine pitch tapping job where a precision trip tap is required. The tap may be tripped either by the conventional trip plate or by a lever. Both means of tripping are furnished with the ool. To use the tap as a lever trip tool, a stop can be rigged up on the cross-slide to contact the long handle at the rear of the body. The trip plate can be removed if the lever trip is used.

The Class PS tap is built in three sizes covering a range from 1⅝ in. up to 6 in. The 3-in. size handles from 1⅝ to 3 in., the 4-in. size from 2 to 4 in., and 6-in. size from 3 to 6 in.

New Winfield Carburetor

A new feature of the Winfield carburetor for 1933 of the Winfield Carburetor Co., Ltd., Los Angeles, Calif., is an accelerating pump which supplements a double accelerating well. The accelerating pump is of the diaphragm type and is located at the bottom of the float chamber. The diaphragm is raised by a spring and drawn down by vacuum in the chamber below it, this chamber communicating with the inlet riser beyond the throttle. If the engine is throttled, there is a comparatively high vacuum in the inlet riser and the diaphragm of the accelerating pump is drawn down. If now the throttle is opened suddenly, the vacuum is destroyed and the spring forces the diaphragm up, thereby forcing gasoline out of the pump chamber to the main nozzle and maintaining the mixture proportion in spite of the sudden increase in the demand for fuel.

April Output of 188,284 Puts Industry 5% Ahead of 1932 in First Four Months

Industry Has Best Month since June, 1932, when Production Gains 21 Per Cent on April Last Year and Increases 50.5 Per cent Over March, 1933

WASHINGTON, D. C.—April production of cars and trucks in the United States and Canada amounted to 188,284, according to the Census Bureau. This is the largest monthly total since July, 1932, and represents a gain of 21 per cent over April, 1932, when production was 155,136. The increase over the March, 1933, total of 125,224 is 50.5 per cent.

At the end of the first four months of the year, the industry was 5 per cent ahead of 1932 with a total output of 557,033 against 528,383 in the same period last year. During this period passenger car production totaled 571,914 against 433,119 a year ago, a gain of 9 per cent, while truck output numbered 85,119 as compared with 95,364 in the first four months of 1932, a loss of 11 per cent.

April production of passenger cars totaled 159,678 and shows a gain over last year of 26 per cent and of 50 per cent over March, 1933, while trucks just beat out April a year ago with a gain of 0.2 per cent. The truck increase from March, however, amounted to 53 per cent.

Canadian output increased 21 per cent over a year ago and was 25 per cent greater than in March, 1933, the actual figures being 6957 cars and 1298 trucks for a total of 8255.

The official April production figures place the AUTOMOTIVE INDUSTRIES index of production, corrected for seasonal, at 44 as compared with 36 in April, 1932, and 32 in March, 1933.

Federal Reserve Business Indexes

	April 1933	March 1933	April 1932
Industrial Production	P67.0	60.0	63.0
Automotive Production	P44.0	27.0	35.0
Automotive Employment	41.5	41.9	55.1
Automotive Payrolls	32.3	27.0	47.1

P—Preliminary.
Indexes adjusted for seasonal except payrolls.

New Dodge Two-Tonner Is Priced at $795

DETROIT — With the announcement of its two-ton truck, Dodge Brothers completes the introduction of its standard 1933 line which consists of commercial vehicles introduced in January and February, the new 1½-tonner described in *Automotive Industries* of April 29 and the new two-tonner. Prices on the new two-ton job are unchanged from the previous series, the base chassis price being $795 for the 136-in. wheelbase. There is also a 165-in. wheelbase edition of this model. Mechanically it follows closely the general lines of the 1½-ton model with sizes increased in proportion. One of its special features is a five-speed transmission.

Auburn Appoints Harvey

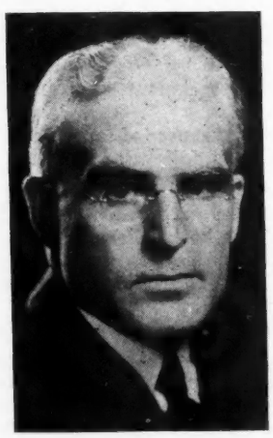
BOSTON, MASS.—J. C. Harvey has been appointed distributor of Auburn automobiles in Boston and Eastern Massachusetts.

Roy D. Chapin Named President of Hudson

McAneeny Succeeds Him as Chairman of Board

DETROIT—Roy D. Chapin has been elected president of the Hudson Motor Car Co. and at the same time becomes general manager, thus returning to active participation in the operations of the company. He succeeds W. J. McAneeny who was elected chairman of the board, a post formerly held by Mr. Chapin. Mr. McAneeny was elected president in 1929 following the death of the then president of the company, R. B. Jackson, who was elected president of the company in 1923 when Mr. Chapin retired as president to head the board of directors.

Not only is Mr. Chapin one of the industry's real pioneers, but he is one its most popular and colorful figures. Moreover, his service as Secretary of Commerce under President Hoover brought him fame that is nation wide.



W. J. McAneeny

Roy D. Chapin

In 1904, at the age of 24, he became sales manager of the Olds Motor Works, then the largest automobile manufacturers in the world. Subsequently he became general manager of Thomas-Detroit and in 1908 became active head of Chalmers-Detroit which he helped to organize. In 1909, Mr. Chapin and his associates organized the Hudson Motor Car Co. as an offshoot of Chalmers, and in 1910 it became an entirely separate organization with Mr. Chapin as its first president.

Mr. Chapin is a former president of the National Automobile Chamber of Commerce and was long the chairman of his highway committee.

Brake Lining Assn. Adopts New Code

NEW YORK—A new code of safe stopping distances has been adopted by the Asbestos Brake Lining Association, Commissioner W. J. Parker announced this week. The code covers stopping distances from 20 m.p.h. as follows: four wheel brakes —excellent, 20 ft.; good, 25 ft.; unsafe, 35 ft.; two wheel brakes—excellent 30 ft., good 37 ft. and unsafe 45 ft.

NEWS

May Production Total of 210,000 in Sight as Sales Hold Strong Up-Trend

Group of Cars Just Above the Lowest Price Class Currently Showing Greatest Gains Over Last Year

By Athel F. Denham
Field Editor, Automotive Industries

DETROIT—The third week in May once more showed a remarkable uptrend in retail automobile sales indicating that total sales for May almost definitely will reach or exceed the 170,000 market estimated last week. Virtually every major producer is running ahead of last year on retail sales with the group immediately above the lowest priced field showing the greatest proportionate gains. This group includes Pontiac, Oldsmobile, Dodge Six and Plymouth DeLuxe. Production has been stepped up by several companies since mid-month and it is apparent now that production may reach 210,000 units, including trucks and export and may even exceed this figure.

The most recent production increase has been in the case of Plymouth with final schedule calling for more than 32,000 cars during May. Each week since May 1 has shown a new high record for sales by Plymouth dealers. The writer estimates that retail sales during May for both Chrysler and General Motors will be ahead of any month since July or June, 1931.

Hudson retail deliveries are also picking up sharply as the new special six enters the picture while Dodge truck orders are running well ahead of anything in the past twelve months.

Dealers Study Used Car Control Plans

Many See in Recovery Bill Opportunity to Stop Ruinous Trading

NEW YORK—The possibilities of controlling used car allowances under the National Industrial Recovery Bill is attracting widespread interest in dealer circles, as many of the industry's retailers have long felt that cooperative action, heretofore prohibited by law, is essential to the solution of the trade-in problem. If it is possible to control used car trading under the Bill, it seems obvious that it will have to be done by the dealers themselves through their local and in some instances their state trade associations.

The question of how far the federal government can go in the regulation of intrastate commerce is, of course, involved, but it is felt in some quarters that this difficulty can be circumvented either on the ground that uncontrolled intrastate commerce would nullify the control of interstate commerce, or by levying a heavy license fee on all business not operating under the Bill.

Automotive Daily News Sold to Geo. M. Slocum

DETROIT—*Automotive Daily News* has been sold by MacFadden publications to George M. Slocum, its Detroit manager. After June 1, it will be published in Detroit and its editor will be Chris Sinsabaugh with W. C. Callahan as managing editor. William Cotton will be advertising manager and Barbara Crighton business manager.

Thermoid Reports Loss

NEW YORK—Net loss of the Thermoid Co. in the quarter ended March 31, amounted to $103,363 after charges as compared with a loss of $106,686 in the corresponding 1932 quarter.

Byron C. Foy, vice-president of the Chrysler Corp. and president of DeSoto, who will pace the first lap of the Indianapolis Race in a Chrysler custom imperial roadster.

April Car Registrations Estimated at 117,500

PHILADELPHIA—April registrations of new passenger cars in the United States amounted to 117,500 against 121,000 a year ago and 78,741 in March of this year, according to estimates based on returns from 40 states. The decline from April, 1932, amounts to approximately 3 per cent and the increase over March is about 49 per cent. Comparing these estimates with totals obtained by factory reports from dealer delivery records, indicates that there still is considerable lag between sales and registrations as factory data point to sales substantially in excess of registration reports.

On the basis of these partial returns Chevrolet is in the lead with 39,000, Ford second with 25,500, and Plymouth third with 15,000 units. As compared with April, 1932, Chevrolet shows a decline of about 14 per cent, Ford an increase of 305 per cent and Plymouth an increase of approximately 5 per cent.

Zeder Heads Sponsors for S. A. E. Congress

Tentative List of Speakers Announced by Headquarters

NEW YORK—Fred M. Zeder, Vice-president in charge of engineering of the Chrysler Corp., has just been appointed Chairman of the Sponsorship Committee for the forthcoming S.A.E. International Automotive Engineering Congress. His confreres are J. M. Crawford, Chevrolet Chief Engineer; E. A. Johnston, Director of Engineering of I.H.C.; L. V. Newton, Automotive Engineer of Byllesby Engineering & Management Corp. and D. G. Roos, Chief Engineer of Studebaker.

Among those who are expected to appear on the Congress program are: **L. H. Pomeroy**, Daimler Co., Ltd., England; **George Broulhiet**, Paris, France (invited); **Prof. Dr. Ing. A. Loschge**, Technische Hochschule Muenchen, Germany (invited); and other prominent foreign engineers; **C. F. Kettering**, General

(Turn to page 659, please)

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

Business in various lines last week either held its own or increased, despite the intrusion of unsettlement in Europe. The Steel plants were more active; wholesale and retail trade was better, and crop weather improved. The Guaranty Trust Company's preliminary index of business activity for April stood at 55.5, as against 53.6 for the preceding month and 60.0 a year ago. The company's index of wholesale commodity prices on May 15 was 43.7, as against 35.8 a month earlier and 36.0 a year ago. The current figure marks the first time that the index has been above that a year ago since September, 1929.

Freight Loadings Up

Railway freight loadings during the week ended May 13 totaled 531,095 cars, which marks an increase of 13,835 cars above those during the preceding week, an increase of 13,835 cars above those a year ago, but a decrease of 215,962 cars below those two years ago.

Power Production Steady

Production of electricity by the electric light and power industry of the United States during the week ended May 13 was 2.2 per cent above that during the preceding week.

Construction Quiet

Construction contracts awarded in 37 eastern States during April totaled $56,573,000 as against $121,704,800 in the corresponding period last year. Residential contracts awarded were almost 20 per cent above those during the preceding month.

Commercial Failures Less

Commercial failures during April, according to Dun & Bradstreet, Inc., numbered 1921, as against 2816 a year ago. The liabilities involved in the April failures amounted to $51,097,584, as against $101,068,693 a year ago.

Fisher's Index

Professor Fisher's index of wholesale commodity prices for the week ended May 20 stood at 60.6, the highest since the week ended Oct. 29, 1932, as against 59.5 the week before and 59.2 two weeks before.

Stock Market Firm

Although prices were more or less unsteady from time to time, the stock market last week remained firm. Bond prices continued to advance steadily, especially the low-priced and speculative issues. The volume of trading was relatively large, and the net changes for the week were irregular, but small.

Federal Reserve Statement

The consolidated statement of the Federal Reserve banks for the week ended May 17 showed decreases of $8,000,000 in holdings of discounted bills and of $37,000,000 in holdings of bills bought in the open market. Holdings of Government securities remained unchanged. The reserve ratio on May 17 was 67.1 per cent, as against 64.6 per cent a week earlier and 63.5 per cent two weeks earlier.

Stewart-Warner Elects Three New Directors

CHICAGO—As the result of an agreement between C. B. Smith, president, and Oscar U. Zerk, representing a group of stockholders, the annual meeting of the Stewart-Warner Corporation was adjourned until June 1st when it will be resumed in Richmond, Va.

The election of three new directors gives the officers of the company a minority representation on the board as now constituted. The new directors are Eugene V. R. Thayer, formerly a director of Stutz Motor Car Co., Robert J. Dunham and Ralph M. Shaw. Joseph E. Otis, Jr., as was announced some time ago, is also a new member of the board.

The statement of the company shows a net loss of $691,801 for the first quarter of 1933, as compared with a net loss of $535,760 in the corresponding quarter of last year.

Motorists to Pay 42% of Public Works Cost

Political Expediency Rules as Congress Vetoes Sales Tax—Retains Excise Levies

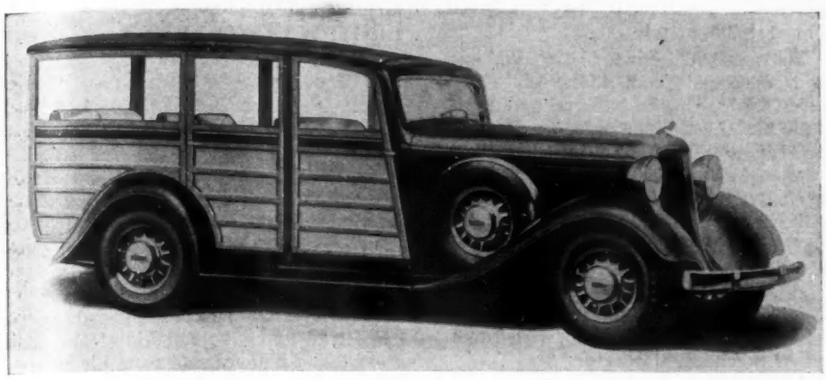
WASHINGTON, D. C.—Brought to the floor of the House of Representatives to be jammed through under the 6-hr. gag rule, the Industrial Recovery-Public Works bill as reported by the House Committee on Ways and Means carried the obnoxious ¾c. per gal. tax on gasoline. This burden is proposed to be superimposed on motorists as a means of raising $92,000,000 per year of the $220,000,000 tax levy to be raised to meet interest and principal on the $3,300,0000,000 program works.

The bill also proposes to extend to June 30, 1935, as it was expected they would be the present excise taxes, including those on automobiles, trucks, accessories and tires, costing the automotive and related industries $200,000,000 a year. The taxes had been scheduled for abolition on June 30, 1934. Extension of the period for another year really makes the Industrial Control bill a major tax measure. For it carries increased rates even on normal taxes, on corporate taxes and other forms of taxation.

Pleas of the National Automobile Chamber of Commerce, the American Automobile Chamber of Commerce, the National Automobile Dealers Association, the American Farm Bureau Federation, and other interests could not stop the imposition of the additional tax or the extension of the excise taxes. Director of the Budget Lewis W. Douglas and President William Green of the American Federation of Labor favored the additional gas tax. Mr. Green recommended it. Mr. Lewis suggested it as being a "sure" source of revenue. The additional gas tax will represent 42 per cent of the sinking fund to be established, while only 12½ per cent of the $3,300,000,000 is to be expended on public highways, for which $400,000,000 is provided for public-works.

The committee turned back to the old formula of one-third on population, one-third on area and one-third on mileage of roads for distribution of the road funds. The bill as originally drawn provided for highway construction to be administered through the President in cooperation with the state highway departments, the funds to be allocated to each state to the extent of 75 per cent under the terms of the present Federal aid act, and 25 per cent to be based on populations of the states. The idea was to absorb labor from the cities where it is heaviest. Arterial highways would have been the recipient of large expenditures. The middle west and east with their numerous and larger centers of population, would have seen much of this construction. The new form, shifts it to the south and far west.

New Dodge Suburban Semi-Sedan



New Dodge Six Station Wagon Known as the Suburban Semi-Sedan

First Chevrolet Car Assembled at Chicago

CHICAGO, May 22—Unofficial No. 1 Chevrolet has been assembled in the General Motors building at the Century of Progress exhibition in the presence of invited guests and driven off the line under its own power.

The official first car was to be assembled Saturday, May 27, and the occasion of the unofficial launching was in the nature of a dress rehearsal.

Officials who attended were: Rufus C. Dawes, president; Major Lohr, general manager; L. K. Cooper, Chicago, regional manager for Chevrolet; B. E. Koether, director of the sales section for General Motors; R. K. Crooker, advertising manager, Chevrolet, and J. A. Grier, in charge of the exhibit.

Cars assembled on the fair grounds will be of two body types only, coupes and coaches on the 110-inch wheelbase.

Brake Lining Assn. Gets Ready for Recovery Act

NEW YORK—The Asbestos Brake Lining Association already is taking steps to meet the requirements of the Federal Recovery Bill, according to a statement of President Robert E. Lee.

Seanor and Taylor Are Promoted by White Co.

CLEVELAND—Harry E. Seanor, vice-president and district manager of the Chicago Region, has been promoted to vice-president in charge of leading national account selling of the central west, according to an announcement by George F. Russell, vice-president and sales manager of The White Co.

Seanor will be succeeded as district manager of the Chicago Region by Edmund H. Taylor who has been manager of the Southern New England District, with headquarters in Worcester, Mass. Seanor will retain his headquarters in Chicago and in addition to his duties as vice-president will cover national and fleet accounts and assist in merchandising White trucks and buses in Minneapolis, Omaha, Kansas City, St. Louis, Indianapolis and Detroit.

Checker Halves Loss

NEW YORK — Checker Cab Mfg. Co. reports net loss for the first quarter of 1933 after charges, etc., of $77,274, against a loss of $159,652 in the same period last year.

Trico Reports Profit

BUFFALO—Trico Products Corp. reports net profit after charges of $170,756 for the first quarter of 1933 against a profit of $356,459 in the same period in 1932.

Exports, Imports and Reimports of the Automotive Industry For April and Four Months Ended April, 1933-1932

	April				Four Months Ended April			
	1933		1932		1933		1932	
	Number	Value	Number	Value	Number	Value	Number	Value
Automobile, parts and accessories	....	$7,371,951	....	$7,810,880	....	$27,181,376	....	$31,354,326
Motor trucks, buses and chassis (total)	....	1,239,867	1,630	850,581	....	4,793,378	9,441	4,298,002
Under one ton	443	125,615	151	36,451	1,247	325,017	1,087	275,001
One and up to 1½ tons	1,852	723,694	1,140	490,103	8,917	3,226,105	7,288	2,818,018
Over 1½ tons to 2½ tons	271	203,512	257	198,103	956	755,026	712	584,485
Over 2½ tons	83	182,501	73	120,480	218	421,914	288	520,090
PASSENGER CARS								
Passenger cars and chassis	5,662	2,707,581	4,449	2,958,786	23,770	11,302,274	19,407	11,240,484
Low price range $850 inclusive	5,279	2,277,716	3,559	1,870,083	22,107	9,350,478	16,376	7,654,447
Medium price range over $850 to $1,200	234	218,096	477	469,363	962	926,434	1,788	1,738,694
$1,200 to $2,000	101	143,994	178	239,036	473	716,831	621	818,372
Over $2,000	19	56,975	140	357,614	104	268,756	350	925,235
PARTS, etc.								
Parts except engines and tires	....	.....	....	.....	....	.....	....	.....
Automobile unit assemblies	....	2,151,013	....	2,065,271	....	5,801,064	....	8,444,108
Automobile parts for replacement (n.e.s.)	....	818,832	....	1,153,568	....	3,370,937	....	4,507,138
Automobile Accessories	....	119,334	....	161,117	....	469,662	....	770,596
Automobile service appliances	....	63,385	....	166,913	....	253,663	....	662,536
Airplanes, seaplanes, and other aircraft	22	263,518	8	67,250	148	1,902,028	40	424,877
INTERNAL COMBUSTION ENGINES Stationary and Portable								
Diesel and Semi-Diesel	2	3,713	....	.....	6	21,719	12	61,945
Other stationary and portable:								
Not over 10 hp.	205	17,896	458	31,131	787	55,015	1,313	92,141
Over 10 hp.	69	35,937	39	20,900	214	99,977	214	145,382
Automobile engines for:								
Motor trucks and buses	47	9,817	250	41,598	487	77,074	946	156,764
Passenger cars	2,361	127,344	2,861	239,828	6,911	449,424	8,282	763,153
Aircraft	14	56,870	22	74,739	651	444,346	87	273,343
Accessories and parts (carburetors)	....	79,476	....	92,711	....	311,407	....	143,898
IMPORTS								
Automobile and chassis (dutiable)	36	6,982	40	22,174	133	55,639	139	121,161
Other vehicles and parts for them (dutiable)	....	8,956	....	3,870	....	25,099	....	14,231

Qualifiers Beat 1932 Marks in Time Trials

Cummings Does 118.521 M.P.H. to Cinch Pole in Indianapolis Race

INDIANAPOLIS—In spite of increasing the qualifying distance for the annual 500 mile race at Indianapolis from 10 miles to 25 miles, the speeds attained this year are well in access of the marks made last year. Pole position was won by Wild Bill Cummings in a rear-drive 8-cylinder Miller engined job with a speed of 118.521 m.p.h. Last year Lou Moore secured the coveted position with a front drive by lapping the bricks for only ten miles at a speed of 117.363 m.p.h.

In the first few days of qualifying, 22 entrants cinched the right to face the starter on May 30 with speeds ranging from 109.850 m.p.h. made by Louie Schneider, winner of the 1931 event, to the better than 118 m.p.h. made by Cummings. Second best speed was made by Frank Brisko in the only four-wheel drive entry, the speed being 118.388 m.p.h.

The total number of starters has been increased from 40 to 42, which leaves twenty more cars to make the grade during the remaining days of qualifying. To qualify a minimum speed of 100 m.p.h. for 25 miles or ten laps must be reached. Other changes in the rules this year include limiting the fuel capacity to 15 gal., reduction in weight requirements to 7 lb. per cu. in. of displacement, total lubricating supply shall not exceed 6 gal. and the cars shall be fitted with some sort of mechanical starter.

The general feeling around the track seems to favor one of the four car team sponsored by Harry Hartz and Fred Frame, last year's winner, as having the best chance of being the first to receive the checkered flag. The cars consist of two eight-cylinder front-drive jobs and two four-cylinder rear-drives. However, Bill Cummings and Grisko also have a very strong following.

QUALIFYING SPEEDS AT INDIANAPOLIS

Car	*Driver*	*No. of Cylinders*	*Type of Drive*	*Speed M.P.H.*	*Engine Make*
Sampson Radio	C. Gardener	16	Rear	112.319	Sampson
Boyle Products	Bi'l Cummings	8	Rear	118.521	Miller
Miller-Hartz	Fred Frame	8	Front	117.864	Miller
Miller Spe.	L. Spangler	4	Rear	116.903	Miller
Studebaker Spe.	Tony Gulotta	8	Rear	113.778	Studebaker
Studebaker Spe.	L. Johnson	8	Rear	110.097	Studebaker
Studebaker Spe.	C. Bergere	8	Rear	115.643	Studebaker
Studebaker Spe.	Z. Meyers	8	Rear	111.099	Studebaker
Studebaker Spe.	L. Corum	8	Rear	110.465	Studebaker
Floating Power Spe.	Ernie Triplett	4	Rear	117.658	Miller
Abe's-Fink Spe.	H. Stubblefield	8	Rear	114.784	Buick
Dursenberg Spe.	Ira Hall	8	Rear	115.739	Duesenberg
F.W.D. Spe.	Frank Brisko	8	4 Wheel	118.388	Miller
Russell 8	R. Snowberger	8	Rear	110.769	Studebaker
Foreman Axle	Lou Moore	8	Rear	117.843	Miller
Gilmore Spe.	H. Wilcox	8	Rear	117.649	Miller
Sullivan-O'Brien	W. Cantlon	4	Rear	113.384	Miller
Bowes Seal Fast	Deacon Litz	4	Rear	113.138	Miller
Tydol Spe.	Louie Meyer	8	Rear	116.977	Miller
Edelweiss Spe.	L. Schneider	8	Rear	109.850	Miller
Goldberg Bros.	Bennie Hill	16	Front	110.264	
Frame-Miller Spe.	Pete Kreis	8	Front	114.370	Miller

Canadian G.M. Payroll Largest in 12 Months

TORONTO—Reflecting the business upturn in Canada, the payroll of General Motors of Canada Limited for April reached a high for the last 12 months of $384,000, according to President R. S. McLaughlin. Scheduled production of the Canadian plant for the months of June and July has been increased by 1600 car units, it is announced.

S.E.A. Turns Thumbs Down on Two Shows

NEW YORK—The Service Equipment Associates have adopted a resolution stating that its members were of the opinion that a trade show in 1933 would be an unnecessary and unwarranted expense. The Associates also voiced their belief that, if any show be held, it be sponsored equally and held under the auspices of both the N.S.P.A. and the M.E.M.A. The boards of directors of the two latter associations are to be requested to reconsider the decision to hold two shows.

N.A.C.C. to Discsus Recovery Bill Plans

NEW YORK—Whether the automotive industry should plan to operate under the National Industrial Recovery Act will be discussed by the members of the National Automobile Chamber of Commerce at that organization's annual meeting which has been set for June 15, instead of June 8 as originally scheduled. The meeting will be held at the chamber offices here.

Directors will also be elected to fill two vacancies. Terms of directors Brosseau, Cord and Macauley also expire at this meeting.

Ford Steel Plant Rumors Explained

Detroit News Says Stories Grew Out of Move to Block Rise in Steel Quotations

DETROIT—Describing it as the inside story how Henry Ford met an implied threat from the steel industry to raise prices arbitrarily to automobile manufacturers, the Detroit *News* said Tuesday of this week: "For several weeks rumors spread that Ford was about to sell his steel mills and blast furnaces and even his entire Rouge plant, to either the Bethlehem Steel Corporation or the United States Steel Corporation and return to Highland Park to manufacture his cars.

"This is what actually happened:

"Alarmed by the threatened rise in steel prices, automotive manufacturers met to discuss the situation. Representatives were appointed to meet with Ford to learn if he would present a united front with them to resist the price boost.

"The meeting took place in Ford's office. He informed them he saw no reason for alarm as far as he was concerned. He pointed out that he had stocks of steel on hand gained from salvaging ships he bought from the Government after the World War, as well as structural steel in his Rouge plant buildings, and that if it became necessary, he could raze those buildings and have enough steel—5,000,000 tons—to enable him to continue manufacture at the Highland Park plant for ten years.

"The conversation was repeated, became garbled as it was passed from mouth to mouth, and finally assumed the shape that Ford actually was moving back to Highland Park. Color was lent to this version by the fact that he was storing machinery in the Highland Park plant. This was machinery which had been supplanted by more modern equipment in the Rouge plant, but instead of scrapping it, as has been his custom, he decided to store it, believing it will be needed when the country quickens to its productive energies."

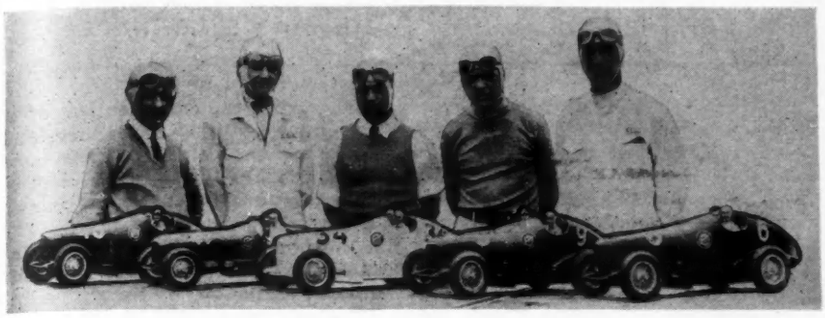
AC Appoints Rantsch

FLINT—Appointment of Alfred C. Rantsch as engineer in charge of sales promotional work of the die cast plant of the AC Spark Plug Company is announced by Barlow H. Curtice, president. Mr. Rantsch has been connected with the die cast industry for 25 years both in production and sales capacities.

Auburn Shipments Rise

AUBURN, IND.—Shipments from the Auburn Automobile Co. for the first ten days of May equal shipments for the entire month of May in 1932, according to W. H. Beal, president.

The Studebaker Team at Indianapolis



The drivers are, from left to right, Luther Johnson, L. L. "Slim" Corum, Tony Gulotta, Zeke Meyers and Cliff Bergere. Note the new streamlining on the bodies.

Zeder Heads Sponsors For S. A. E. Congress

(Continued from page 655)

Motors Corp.; **E. C. Elliott,** president, Purdue University; **Daniel Willard,** Baltimore and Ohio Railroad; **L. C. Lichty,** Yale University; **David Beecroft,** Bendix Aviation Corp.; **J. C. Hunsaker,** Goodyear Zeppelin Corp.; **W. B. Stout,** Stout Engrg. Laboratories; **E. P. Warner,** McGraw-Hill Pub. Co.; **G. W. Lewis,** National Advisory Committee for Aeronautics; **Col. H. W. Alden,** Timken-Detroit Axle Co.; **F. A. Moss,** George Washington University; **J. F. Winchester,** Standard Oil Co. of New Jersey; **Clinton Brettell,** R. H. Macy & Co.; **Pierre Schon,** General Motors Truck Co.; **Major H. A. Nisley,** Ordnance Department; **Lieut. Col. Brainerd Taylor,** Quartermaster Corps; **Joseph Geschelin,** Automotive Industries; **W. E. John,** New York City; **George Crouch,** H. B. Nevins, Inc.; **M. C. Horine,** International Motor Co.; **B. B. Bachman,** The Autocar Co.; **V. P. Rumely,** Detroit; **F. W. Cedarleaf,** Buick Motor Co.; **W. F. Wise,** Ex-Cell-O Aircraft and Tool Corp.; **A. J. Scaife,** White Motor Co.; **F. C. Horner,** General Motors Corp.; **L. V. Newton,** Byllesby Engrg. and Management Corp.; **C. D. Wiman,** John Deere Tractor Co.; **Fred Faulkner,** Armour & Co.; **J. M. Orr,** Equitable Auto Co.; **T. C. Smith,** American Tel. & Tel. Co.; **L. P. White,** Cities Service Co.; **J. B. Macauley,** Chrysler Corp.; **C. L. Cummins,** Cummins Engine Co.; **J. E. Wild,** United American Bosch Corp.; **K. T. Keller,** Dodge Bros. Corp.; **J. B. Fisher,** Waukesha Motor Co.; **R. F. Anderson,** Auburn Automobile Co: **N. H. Manning,** Briggs Mfg. Co.; **H. L. Horning,** Waukesha Motor Co.; **D. D. Robertson,** Wilkening Mfg. Co.; **R. R. Teetor,** Perfect Circle Co.; **J. P. Stewart,** Vacuum Oil Co.; **W. T. Fishleigh,** Detroit; **J. B. Hill,** Atlantic Refining Co.; **O. C. Bridgeman,** Bureau of Standards; **D. P. Barnard,** Standard Oil Co. (Indiana); **J. M. Crawford,** Chevrolet Motor Co.; **L. P. Kalb,** Continental Motors Corp.; **Alex Taub,** Chevrolet Motor Co.; **Hamilton Filey,** Pittsburgh Screw and Bolt Corp.; **R. N. DuBois,** Continental Aircraft Engine Co.; **F. L. Prescott,** U. S. Army, Air Corps; **Richard Rhode,** National Advisory Committee for Aeronautics; **J. A. Roche,** U. S. Army, Air Corps; **R. H. Gagg,** Wright Aeronautical Corp.; **L. D. Seymour,** American Airways; **P. G. Johnson,** Boeing Airplane Co.; **Jack Frye,** Transcontinental & Western Air, Inc.

Toledo Employment Gains 1200 in Last Four Weeks

TOLEDO — Toledo plants, mostly automotive, have reported a gain of 30 workers last week. This is a total of more than 1200 workers recalled to jobs in the last four weeks.

Several plants not included in the weekly reports have had extensive increases in employment. Libbey-Owens-Ford Glass Co. has been increasing its operations to near the capacity of the plants largely due to the big demand for safety glass and some renewed building activity.

Welfare authorities here reported 190 families taken off relief rolls last week.

April Biggest Month for L.G.S. Devices

INDIANAPOLIS—After setting an all-time monthly sales record in April with shipments of 66,000 free-wheeling clutch springs, the L. G. S. Devices Corp. now is operating 24 hours per day in order to fill orders on hand. According to President Starkey, L.G.S. has been notified to be in a position to ship as many springs in May as in April.

Chevrolet Operates Six Days

DETROIT—Chevrolet plants operated Saturday, May 20, completing the first full six-day week in many months.

Dodge and Plymouth Maintain Fast Pace

DETROIT—During week ending May 20 Dodge retail deliveries totaled 3894 units against 3452 units previous week. Total divided as follows: Dodge passenger cars, 1859; Plymouth, 1679, and Dodge trucks, 356.

Compared with corresponding week last year, the increase was 64.7 per cent. Tuesday Plymouth broke all production records for single day with 1800 cars produced.

Higher Steel Prices Bring Advance Buying

Automotive Consumers Not Perturbed About Effects of Federal Price Control

NEW YORK—Steel buyers as well as sellers are awaiting with keen interest developments with reference to the price control features of the Wagner bill, Washington information being to the effect that the steel industry, because of its basic character, will be among the first to be accorded regulation.

Judging from the volume of business that has been booked by the steel mills in the last ten days, some buyers, upon announcement of higher third-quarter prices for flat steels, concluded that they had nothing to lose and possibly much to gain by anticipating as much of their fall requirements as possible. As a consequence, for the first time in several years there is likely to be a certain amount of steel taken into storage by consumers during the next four weeks as a protection against whatever regulations may develop.

Tonnage steel buyers among automotive consumers are little perturbed about the effect of Government price regulation which is certain to put consumers of equally large quantities on a basis of equality. The smaller buyers are chiefly interested in the spreads between prices for large tonnages and small lots.

Third quarter price advances, ranging from $3 to $4 a ton on virtually all descriptions of flat steels, are looked upon as the probable basis for shaping price control. Present prices continue to apply on all business placed in June and shipped before July 15. Making over of the sheet market's price structure has restored to the list of quoted descriptions full-finished automobile sheets which several months ago had been discontinued.

Pig Iron—Bookings in all of the distributing markets were on the uptrend this week. Full prices are being realized in nearly all transactions and producers characterize the market as the best in several years.

Aluminum—Firm and unchanged.

Copper—Following a few odd lot transactions on a 6¾c, Connecticut Valley, basis, the market firmed at 7c with new business rather quiet.

Tin—The International Tin Pool has announced that it plans to liquidate 5000 of its 21,000 tons holdings during the second half of 1933. The market opened the week easy with prompt Straits quoted at 35½c.

Lead—Quiet and unchanged.

Zinc—Steady and unchanged.

Russel G. Jones

NEW YORK—Russel G. Jones, production manager of General Motors, Japan, Ltd., died on May 6 in Kobe, Japan, following an emergency operation for appendicitis performed several weeks ago.

Willys Gets Court OK on 2,500 Units

Production of 1000 Trucks and 1500 77's Will Keep Plant Busy Until August 1

TOLEDO—A court order for the manufacture of 1000 more of the model D-5 half-ton trucks for International Harvester Co. and 1500 of the Willys 77 model passenger car signed by Judge George P. Hahn in Federal court here will prolong the present operations of the Willys-Overland plant to Aug. 1 for certainty.

L. A. Miller, receiver, who made the application, returned a few days ago from Los Angeles, where he reopened the assembly plant there to take care of Pacific Coast business.

Sales of the Willys 77 have shown a big gain in the last few weeks partially due to the revised price schedule now in effect and to the growing demand for inexpensive replacement cars.

The plant here has 2200 employees on the payrolls completing an order of 4400 of the trucks and 1600 of the passenger cars.

During the current week all payments of back wages due workers at the time the plant went into receivership on Feb. 15 will have been completed.

The court also granted permission of the receivers to request the New York Stock Exchange to list again the preferred and common stocks of the company. No reorganization plans have yet been revealed but it is believed the listing of the stock would indicate preparations for taking the plant out of the receivership.

Mr. Miller said the receivers are trying to keep the plant operating on as broad a schedule as possible until some reorganization may be effected.

Detroit Section Elects H. T. Woolson Chairman

DETROIT—The new officers of the Detroit Section, Society of Automotive Engineers, were installed at the final meeting of the year. They are as follows: H. T. Woolson, chief engineer, Chrysler, chairman; C. R. Paton, chief engineer, Packard, vice-chairman in charge of passenger car activity; C. O. Richards, body engineer of Cadillac, head of the body activity section; William A. Mara, vice-president of Stinson Aircraft Corp., vice-chairman of aeronautic activity; D. A. Wallace, vice-president in charge of manufacturing of Chrysler Corp., vice-chairman of production activity; Dr. S. M. Cadwell, United States Rubber Co., in charge of student activity; J. W. Votypka, chief engineer of LeBaron Body, secretary; and F. W. Marschner, western manager for New Departure, treasurer.

First Quarter Statements Reflect Effects of Banking Crisis on Industry's Earnings

PHILADELPHIA—Income reports of thirteen motor vehicle manufacturers for the first quarter of 1933 show a net loss for the group of $2,343,111, as contrasted with a net profit of $2,221,030 in the corresponding quarter of 1932. Exclusive of General Motors, which was the only company in the group to show a profit for the quarter, the combined loss of the remaining twelve manufacturers amounted to $9,213,118 against a loss of $7,471,997 a year ago.

During the same period, a group of 27 parts and equipment makers show a combined net loss of $3,994,309 against a loss of $2,319,229 in the first quarter of 1932. Only five of the companies included in the group operated at a profit in the first three months of 1933 while last year in the same period, there were 10 in the group.

Although it is impossible to enthuse over red ink under any conditions, the showing cannot be regarded as discouraging. During the first two months of the quarter business was faced with a banking situation which was steadily getting more critical and then the banking holiday paralyzed business during the first two weeks of March. With the big up-swing in second quarter volume, the showing at mid-year unquestionably will be very different. Details figures follow:

	Net Profit or Loss After Depreciation, Interest and Taxes, etc.	
	Quarter Ended March 31, 1933	Quarter Ended March 31, 1932
Auburn Automobile Co...	$577,466d*	$7,959*
Checker Cab Mfg. Corp..	77,274d	159,652d
Chrsyler Corp.....	3,038,082d	2,066,485d
General Motors Corp.....	6,870,007	9,693,027
Graham-Paige Motors Corp.	86,696d	166,589
Hudson Motor Car Co....	1,491,005d	1,245,943d
Hupp Motor Car Co.....	522,997d	596,176d
Mack Trucks, Inc.....	366,908d	313,071d
Nash Motors Co.....	134,136d*	211,927*
Packard Motor Car Co...	1,131,823d	1,563,983d
Pierce-Arrow Motor Car Co.	259,505d	193,534d
Reo Motor Car Co.....	459,245d	753,277d
Yellow Truck & Coach Mfg. Co.....	1,067,981d	966,351d
Total	2,343,111d	2,221,030
Total except General Motors	9,213,118d	7,471,997d
Bendix Aviation Corp....	267,463d	26,364
Bohn Aluminum & Brass Corp.	100,602	73,201d
Borg-Warner Corp.....	384,185d	167,722
Briggs & Stratton Corp..	1,342	8,959
Briggs Mfg. Co.....	895,963d	953,993d
E. G. Budd Mfg. Co.....	397,488d	541,347d
Budd Wheel Co.....	303,467d	450,167d
Campbell Wyant & Cannon Fdry. Co.....	69,535d	23,379d
Clark Equipment Co.....	136,569d	134,166d
Eaton Mfg. Co.....	207,429d	57,723
Electric Auto-Lite Co...	70,402	547,680
Gabriel Co.....	28,865d	43,465d
Hayes Body Corp.....	98,195d	100,597d
Hercules Motors Corp....	43,975d	48,567d
Houdaille-Hershey Corp..	218,435d	225,592d
Marlin-Rockwell Corp...	53,796d	2,720d
Midland Steel Products Co.	62,903d	139,135d
Motor Products Corp....	147,725d	179,526d
Motor Wheel Corp.....	227,578d	228,609d
Mullins Mfg. Corp.....	126,469d	16,623
Spicer Mfg. Co.....	146,954d	171,880d
Thermoid Co.....	103,363d	106,686d
Thompson Products Co., Inc.	72,996d	5,140
Timken Roller Bearing Co.	276,000d	217,617
Trico Products Corp.....	170,757	356,459
United American Bosch Corp.	76,503d	306,259d
L. A. Young Spring & Wire Corp.....	8,444	5,773
Total	3,994,309d	2,319,229d

*Quarter ending Feb. 28.

d — deficit.

Bauer Sails for World Economic Conference

NEW YORK—George F. Bauer, manager of the Export Department of the National Automobile Chamber of Commerce and chairman of the World Trade League of the United States, sailed Saturday for Europe aboard the S.S. Bremen. Mr. Bauer will represent the motor organization as a delegate at the Convention of the International Chamber of Commerce in Vienna, after which he will go to London to follow the proceedings of the World Economic Conference.

CALENDAR OF COMING EVENTS

SHOWS

National Metal Exposition, Detroit .....Oct. 2-6
Motor & Equipment Manufacturers Assoc., Chicago .....Oct. 23-28
Natl. Standard Parts Assoc., Chicago .....Oct. 30-Nov. 3
New York Automobile Show, Jan. 6-13, 1934

CONVENTIONS

National Association of Cost Accountants Convention, Waldorf- Astoria Hotel, New York.....June 12-15
National Industrial Advertisers Assoc., Chicago .....June 26-28
National Metal Congress, Detroit .....Oct. 2-6

MEETINGS

Natl. Automobile Chamber of Commerce, Annual, New York City.June 15
Natl. Retail Hardware Assoc., Indianapolis .....June 12-16
A.S.M.E. Natl. Aeronautic Meeting, Chicago .....June 26-27
American Society for Testing Materials, Chicago .....June 26-30
Automotive Engine Rebuilders Assoc., Annual, Chicago .....July 10-14
S.A.E. International Automotive Engineering Congress, Chicago Aug. 28-Sept. 4
American Chemical Society, Chicago Sept. 11-15
American Transit Assoc., Chicago Sept. 18-20
Natl. Safety Council, Chicago....Oct. 2-6
National Metal Congress, Detroit. Oct. 2-6
American Petroleum Institute, Annual, Chicago .....Oct. 24-26

RACES

Indianapolis Race .....May 30